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The D.S.I.R. and Industry

For 43 years the keynote of our policy has been the scientific conduct of the foundry industry. Now we learn that other and more powerful interests are taking up the refrain. Of outstanding importance was the speech recently made by Sir Edward Appleton, F.R.S., the secretary of the Department of Scientific and Industrial Research, to a Newcastle-upon-Tyne audience. When he referred to the traditional we think he must have had the foundry industry well in mind, for his points were that traditional knowledge was handed down from generation to generation to create a successful "know-how," but this "know-how" is severely restricted in scope as it depends upon the process, tools, and materials remaining unchanged. In the course of his address Sir Edward said:

The approach of the scientist is to ask what lies behind the tradition. He observes the processes used and studies the raw materials. From these observations he evolves a theory on why certain things are done and then tests his theory by scientific experiment; then when he is satisfied as to its truth he is a position to show how the process can be modified to deal with any changes. You will see that science seeks to know the why and wherefore of every process and every time-honoured practice. It is not surprising that those who control traditional industries are not always very ready to accept such inquiries. The structure of a firm in such an industry is designed to operate the traditional processes, not to question them. Its concern is to get on with the job of turning out the goods and trying to sell them, and as long as things are going well people who ask awkward questions are a nuisance. But other people in other countries are asking these questions and are applying the answers and producing disturbing results to the traditionally minded. Therefore, a place must be found for these nuisances, and for using their advice, because there is no other way under modern conditions by which we can hold our own against these competitors.

Now what I have been saying may appear somewhat sweeping and I don't want it to be misinterpreted. Don't think I am advocating a change in industrial practice just for the sake of change. If an industry is serving the public well there is obviously no need for any immediate change, and by the introduction of gradual improvements in the design and quality of its products, by careful management, by clever salesmanship, and even by well-aimed advertising, an industry may hold its own for a long time. But sooner or later a time will come when scientific help is essential, and the industry which has not made a practice of applying science may find the opportunity gone. "Queer Street" is not the address for a new laboratory.

It was pleasing to learn from Sir Edward that the decadence of British industry and its alleged slowness in applying the results of research has been exaggerated, and it is "not so black as it has been painted." Probably the most important part of the speech was the offer of help for the solution of problems by the Department. That does not mean that if a foundry concern is troubled with porosity in pressure resisting castings it will take up the investigation. It would probably refer the inquirer to the appropriate co-operative research association. On the other hand, suppose a firm was despatching highly polished metal articles to the humid tropics, it would do its best to indicate what steps should be taken to ensure proper surface protection. Or again, a few foundries have pickling plants and the problem of waste liquor disposal may arise. Here again, they will find an appropriate laboratory or recommend a reliable consultant. This scheme is new and a special division has been created for its operation.

Sir Edward also warmly endorsed the scheme now in operation in Manchester, where the Chamber of Commerce is interlinked with research activities, as exemplified by the University, and strongly recommended its emulation by other localities. Moreover, such joint bodies should also set up an information bureau.

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NOTES FROM THE BRANCHES

BIRMINGHAM, COVENTRY AND WEST MIDLANDS BRANCH.—There was a large company, including many ladies, at the annual dinner and dance held at the Botanical Gardens, Edgbaston, on January 25. MR. J. W. GARDOM (president of the Institute), who proposed the toast of the branch, paid a tribute to Mr. D. H. Wood. They looked forward to seeing him in the chair, as he had given great attention and assistance in the affairs of the Institute. To him (the president) it was a great pleasure to know that the general secretary (Mr. T. Makemson) had received recognition from the Government of his work during the war. Finally, he wished every success to the Birmingham branch, and especially did he wish success to Mr. Shore during his year of office.

In responding, MR. A. J. SHORE said that while Mr. Gardom had been exalted to the stars, he still kept his feet on the earth as a member of the Birmingham branch Council. He (the branch president) attributed the success of the branch to a hard-working Council, to the members themselves, and pre-eminently to the real executive, the hon. secretary, Mr. A. A. Timmins.

The toast of the Guests, with which was associated that of the Ladies, was submitted by MR. E. C. DICKINSON, senior vice-president of the branch. He extended a hearty welcome to Mr. V. Everard, managing director of Bellis & Morcom, Limited, and to Mrs. Everard. Many people distinguished in the foundry trade, he said, had consented to serve on the Reception Committee for the forthcoming conference to be held in Birmingham, and they were very grateful to them for the work they were doing to make the conference a success. Mr. Dickinson referred to the difficulty of securing hotel accommodation in Birmingham, even when long notice was given, and said that in view of the large numbers expected for the conference offers of hospitality to members of the Institute coming from other parts of the Midlands would be welcomed. Those in a position to offer hospitality should communicate with Mr. Timmins.

MR. V. EVERARD, whose name was coupled with the toast, said they, as guests, took their hats off to the foundry trade for the tremendous amount of work done during the war. The foundry, he considered, had not received its due meed of praise. They, at any rate, thanked foundrymen for all they had done to help to wipe out the totalitarian dictators.

Mr. G. W. Brown acted as toastmaster. Dancing was continued until 1 a.m.

FLAME-GOUGING OF STEEL CASTINGS

According to Mr. A. E. Blake, Jun., writing in the November issue of "Materials and Methods," it is preferable to use a flame touch for removing defective patches from steel castings rather than resort to chipping methods. Experience at the General Electric Companies' Everett foundry in Massachusetts tends to show that the flame gouge method requires the removal of a reduced quantity of metal and leaves a surface well suited to subsequent welding.

CORRESPONDENCE

[We accept no responsibility for the statements made or the opinions expressed by our correspondents.]

SHEFFIELD MECHANICS' INSTITUTE

To the Editor of THE FOUNDRY TRADE JOURNAL.

SIR,—With reference to the request you made in the article carrying the above caption printed on page 21 of your issue of January 3, I find that the circular letter referred to the prospectus issued by the band of Sheffield men who started the Mechanics' Institute in this town. The Twelve Capital Burgesses to whom this copy was addressed gave the project their support, but only in the same degree as other bodies in Sheffield, all of whom took up the idea together with considerable enthusiasm. The Mechanics' Institute began its work in 1833, and lasted until 1891.

The Sheffield City Librarian says that if you are willing to give this copy of the prospectus to the Sheffield collection in the reference library, he will be very glad to accept it.

Your, etc.,

ERIC N. SIMONS,
Publicity Manager,
Edgar Allen & Company, Limited.
Imperial Steelworks,
Sheffield, 9.
January 28, 1946.

[This has been done.—EDITOR.]

BRITISH COLOUR COUNCIL

The British Colour Council has acquired No. 13, Portman Square, London, W.1, for the post-war development of its services to industry. The annual report of the Council for 1944-45 includes the following paragraph:—"Visible proof of the valuable co-operation between the Institute of Vitreous Enamellers and the British Colour Council is shown in the issue of a range of 14 colours technically correct and appealing aspect. The colours, designed for cooking appliances and utensils and fuel boilers, include two colours sponsored by the Ministry of Works, and will appear in the Colour Dictionary, so that objects in vitreous enamel may henceforth fit into the decorative scheme."

FOUNDRY TRADES EXHIBITION

Mr. Kenneth Bridges, managing director of F. W. Bridges & Sons, Limited, informs us that there is every prospect of staging a foundry exhibition at Olympia in September, 1947. It will be remembered that all arrangements were completed for a show to be held in September, 1939—the month war broke out. It is already apparent that the demand for space will exceed that allotted for 1939, and extra space will have to be taken if all wishes are to be met. Within the next few weeks, the organisers will return to the former offices in Grand Buildings, Trafalgar Square, London, W.C.2.

INSPECTION IN A MECHANISED FOUNDRY*

Keeping quality on a par with quantity

By T. COOK

It is only in recent years that a rigid inspection has been introduced in the foundry as a necessary factor in the mass-production of light alloy castings utilised in the manufacture of aero engines. Methods of production have progressed rapidly and, owing to the scarcity of craftsmen, a large number of semi-skilled personnel have had to be employed. This is particularly so in a mechanised foundry, where jobs are split up into various operations to achieve mass-production. It was essential, therefore, that a link be formed to keep quality on a par with quantity. The inspection department forms this link.

Whilst inspection is generally looked upon as a department which exists to find fault with the efforts

FIG. 1.—TYPICAL CORES AND THEIR JIGS.

of production, this is not so; in fact, its aid to production is almost indispensable. One of its main functions is to prevent, as far as possible, the making of scrap castings in the production lines; therefore, the introduction of inspection into the various sections such as coremaking, core dressing, core assembly and moulding bays is most obvious.

Before accurate castings can be produced, a good pattern must be available. If large quantities of castings are required, a metal pattern is preferable. The pattern must be correct and proved that it will produce good castings dimensionally before being released for production. It is, therefore, essential that sample castings should be taken off all equipment.

*A Paper read before the Scottish branch of the Institute of British Foundrymen.

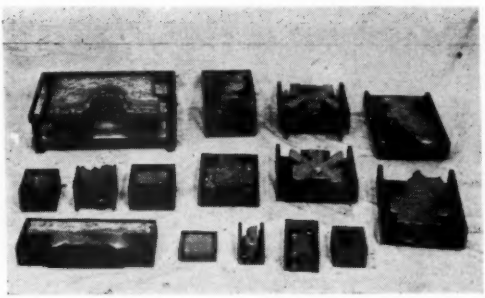


FIG. 2.—SHOWS THE CORES LOCATED IN THEIR JIGS.

The pattern and coreboxes are first released to the experimental foundry which supplies two sample castings, one for dimensional check and one for material check. These castings are made under the same conditions that exist in the production foundry, but have a 100 per cent. inspection during their manufacture. All cores are checked to their respective boxes; moulds are checked to the pattern where possible and the coring-up operation is very closely watched by an inspector, who gives a detailed report to the pattern-shop on all discrepancies, *e.g.*, thin sections, tight fitting core locations, faulty matching up of moulds and cores or any other obvious faults.

FIG. 3.—SHOWS CORES WHICH ARE JIGGED PRIOR TO JOINTING.

Inspection in a Mechanised Foundry

Erection of Jigs and Gauges

It is essential that no faking be permitted in the production of a proof casting, as the patternmaker relies solely on the marking up of a proof casting for any corrections which may be necessary to the pattern equipment. It is also the duty of the inspector to recommend any jigs or gauges which will be necessary for core jigging or setting, particularly on an intricate job where a build up of cores is required.

Fig. 1 shows several cores of this description which require jigging or scraping, it being necessary to establish a more accurate core seating to maintain the build-up of assembly. The jigs used for this operation are also shown in Fig. 1, whilst Fig. 2 shows the cores located in their respective jigs. Cores which are jointed are also jigged prior to gumming together, thus avoiding an accumulation of faults which would exist should these operations not be carried out. In Fig. 3 two such cores are shown, also the jigs and method of location, while Fig. 4 shows cores ready for jigging.

Fig. 5 shows the master base plate for checking the whole assembly, this being a duplicate of the drag mould. Cores are examined individually, as will be seen in Fig. 6. The core shown is checked by a jig bar locating on pins, the swinging arm in the centre checking the angle of the core. In Fig. 7 there is shown a further core added being checked by height gauges. Fig. 8 shows cores, which are built up on base cores, being checked by height gauges. It will also be noted that here is used a standard thickness gauge for checking the metal section between two cores, while Fig. 9 shows the full assembly of cores.

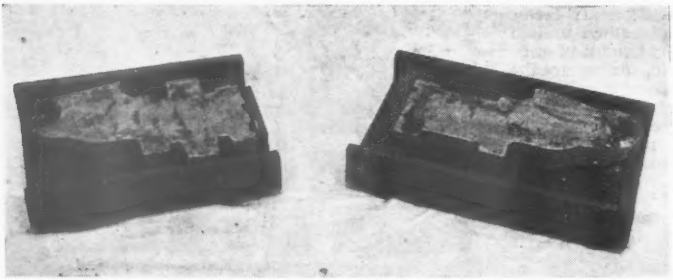


FIG. 4.—SHOWS CORES LOCATED READY FOR JIGGING OPERATION.

Core Scraping Jigs

In Fig. 10 is shown the profile of all cores being checked to guarantee this matching up with the mid part of the mould. The majority of core scraping jigs are of simple design, these being merely parallel bars built up on a standard base plate. The two half cores illustrated are of a fairly bulky nature and liable to sag and distort after stoving and, therefore, require correcting. The cores are located, one from the print seat and one from top wall of metal (Fig. 11). The joint is then scraped prior to gumming and jointing together. The core is again stoved and afterwards checked in a dummy mould, this being made in plaster from the pattern (Fig. 12). The height of the core is also checked, as is shown in Fig. 13. After being passed as satisfactory, it can be assured that these cores will produce an accurate casting. A further method is adopted in several cases, this being a block core assembly, all cores being gummed together in the base core. Fig. 14 shows a dummy mould, three cores and checking jig. In Fig. 15 all cores are assembled in the dummy mould.

Fig. 16 shows how all the cores are set and gummed with the checking fixture in place. After drying, the complete assembly passes to the production line as one

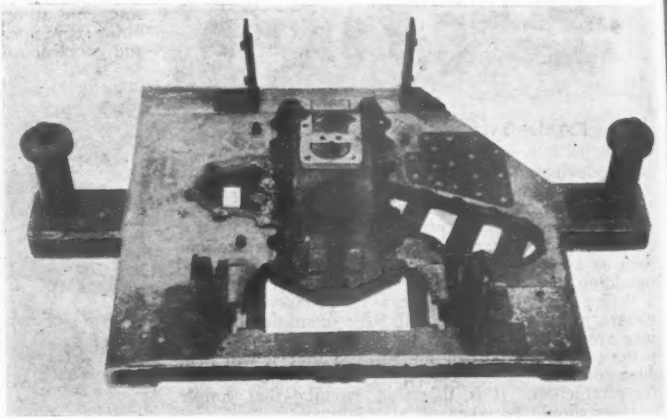


FIG. 5.—SHOWS MASTER BASE PLATE FOR CHECKING THE WHOLE ASSEMBLY.

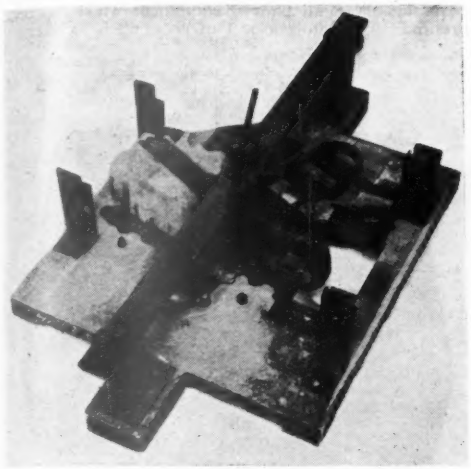


FIG. 6.—SHOWING THE ACTUAL GAUGING OF THE CORE.

unit and is located in the mould with a similar checking fixture, thus guaranteeing accurate coring of the mould. The weight factor of a casting is also very important and general tolerances on metal thickness are

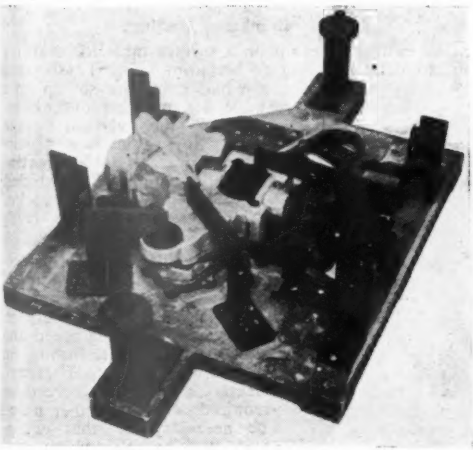


FIG. 7.—IN THIS VIEW A FURTHER CORE IS SHOWN BEING CHECKED FOR HEIGHT.

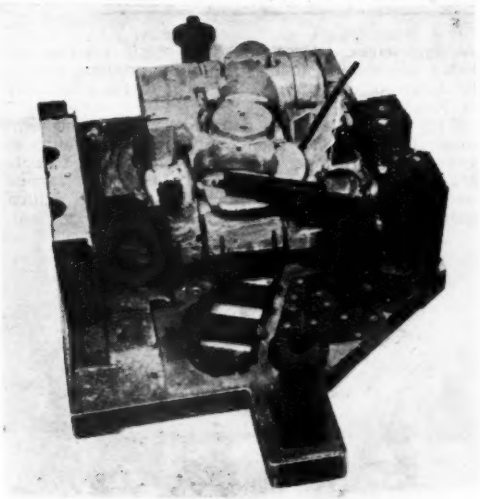


FIG. 8.—SHOWS ASSEMBLY IN AN ADVANCED STAGE.

only ± 0.025, this having to cover the scratch brushing operation as well as the foundry fettling; therefore, nothing can be left to chance and all cores must be as accurate as possible. Jigging of cores to size is, therefore, essential where mass-production is practised. Moreover, it reduces to a minimum the chances of error in coring up the mould.

Dimensional Checking

The procedure as illustrated in Figs. 1 to 16 does not operate in the course of producing a proof casting, but is the outcome of observations made during the

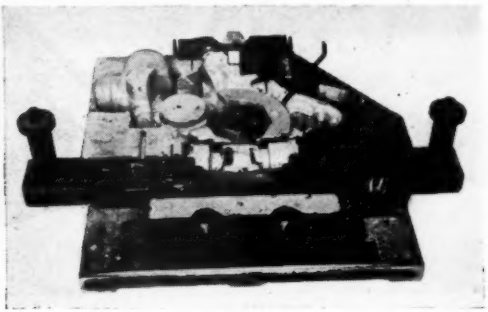


FIG. 9.—SHOWING THE COMPLETE ASSEMBLY.

Inspection in a Mechanised Foundry

proofing stages. After the two proof castings are fettled, one is sent to the inspection proofing section for dimensional check and the other to the laboratory for X-ray.

X-ray examination will determine whether the right casting technique has been established, such faults as blowholes, shrinkage, porosity, etc., being easily detected. X-ray, as an inspectional function, is carried out by the laboratory staff, who pass on, by written report, all information to the department concerned.

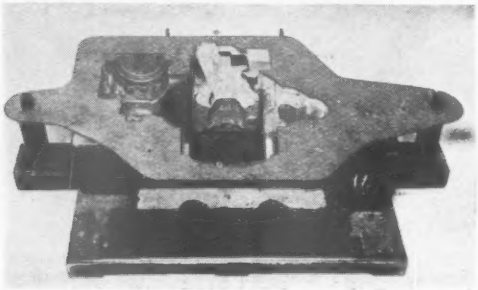


FIG. 10.—SHOWS THE GAUGING OF THE PROFILE.

Should it be unnecessary to carry out a destructive test in the laboratory after X-ray, the sample casting submitted will be forwarded to toolroom for the manufacture of pressure test fixtures, if required.

Accompanying the casting sent for dimensional check is a report giving details of the pattern and corebox numbers used, this being recorded for future reference on a card index system, the records of which cover details of all pattern equipment which has been proofed. The whole aspect of proofing is to ascertain whether the pattern equipment is dimensionally correct for mass-production from both the foundry and machine-shop angles.

FIG. 12.—PLASTER DUMMY MOULD FOR CHECKING CORES.

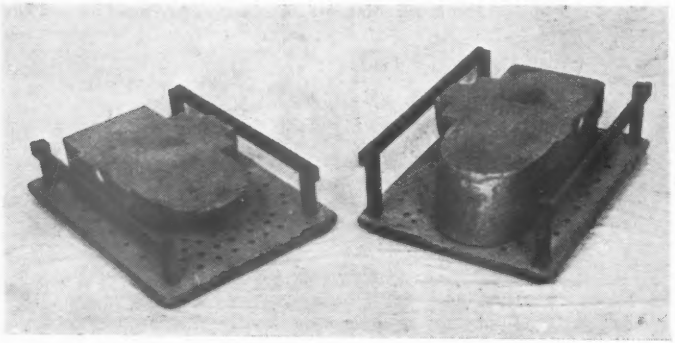


FIG. 11.—THICKNESS GAUGE FOR SIMPLE CORES.

Crankcase Castings

The casting is set up on a surface table for marking out to detail drawing or blueprint. Fig. 17 shows a top half crankcase set up on a table for marking out externally in the vertical plane. Points for setting are usually taken from a moulded portion of casting, cores being avoided. Numerous points are checked prior to a datum line being scribed around the casting.

All castings are fully sectioned and blind bosses, oil ways and intricate sections are fully marked out, discrepancies, however small, being noted and issued to the patternshop in the form of a proof report, clearly stating all corrections required and if a further proof be necessary, or that equipment may be released on production after corrections have been made.

In Fig. 18 there is illustrated the same casting as shown in Fig. 19 after it has been sectioned up to verify the correctness of all internal webs, bosses and metal sections, there being 38 pieces. All castings are marked out with vernier height gauges which give readings to 0.001 in. Dimensions given

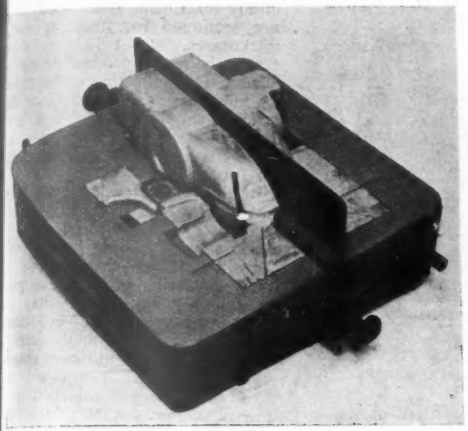


FIG. 13.—HEIGHT GAUGES SET UP.

radially or on a pitch circle diameter are calculated by trigonometry to determine the vertical and horizontal sizes and thus avoid turning a job about its centre. A Pratt & Whitney rotary tilting table is very useful for the larger circular castings, this being accurate to 2 secs. of a degree.

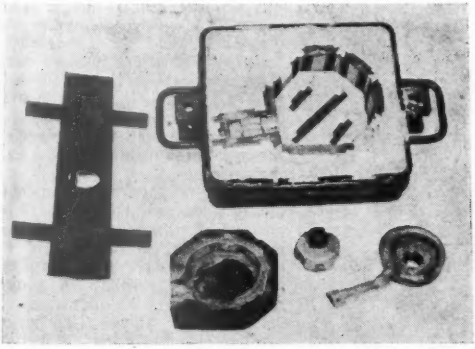


FIG. 14.—SHOWS DUMMY MOULD CORES AND CHECKING JIG.

In Fig. 19 is shown a blower casing set up on a rotary tilting table showing a method of setting out in its simplest form. In Fig. 20 the casting is turned at right angles to that shown in Fig. 19 and will revolve about its centre, thus enabling the nine port flanges and bosses to be marked out.

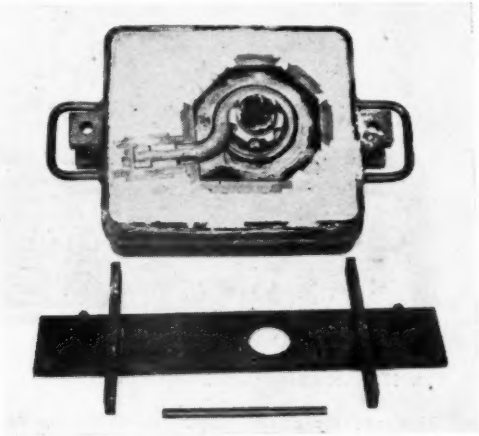


FIG. 15.—CORES ASSEMBLED IN DUMMY MOULD.

Fig. 21 shows the casting fully proofed, being sectioned into 36 pieces. It will be noted here that forged guide vanes are cast in the ports, there being three at each bend. These are the controlling factor in setting up this casting. In Fig. 22 a circular casting with 11 outlets is shown. As all these are on a com-

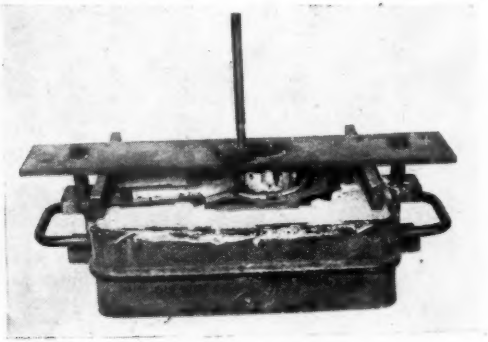


FIG. 16.—SHOWS THE USE OF THE CHECKING FIXTURE.

Inspection in a Mechanised Foundry

pound angle, the necessity for the use of a tilting table is exemplified, as castings could not be marked out accurately by the ordinary surface table methods.

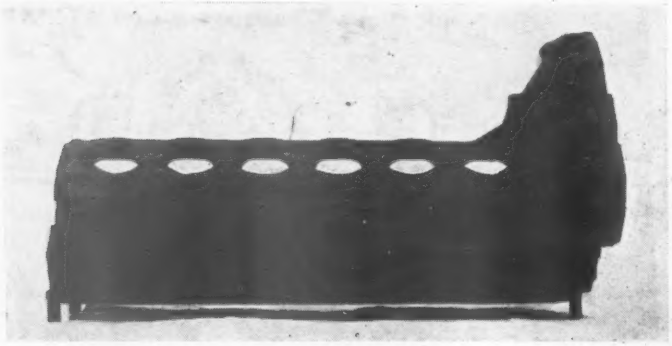


FIG. 17.—SHOWS A TOP HALF CRANKCASE ON A SURFACE TABLE.

Fig. 23 shows the casting angled to determine the centre of one of the ports.

Jig Spotting

It is often necessary to take eight or 10 proofs for dimensional check of the same type of casting. This is due in most cases to several sets of patterns and coreboxes required to facilitate mass-production. It is, therefore, essential that all equipment should be interchangeable. Where proof castings are produced off duplicate equipment, involving a new pattern or set of coreboxes, the castings are quite frequently passed to the machine shops to be finally machined, after which they are sectioned for checking metal thicknesses, etc. This is done especially where production equipment is in duplicate and the proof castings can be loaded in the machine-shop fixtures as a production piece, the location being taken from jig spots as supplied by the foundry.

It should be pointed out here that when a major casting is produced it is given a serial number, the first proof casting bearing this number. When the pattern is finally passed as correct for production, all jigs which may be deemed necessary are produced. These are generally made from a plaster core where intricate shapes are concerned. It is not wise to produce these jigs until such time as the equipment is passed as satisfactory, but they may be manufactured while the casting is in the final proofing stages, and thereby being available when the equipment goes into production.

While a casting is in its proofing stages, contact is made with the planning department concerned to determine the method of machining to be adopted whether by jig spot method or by some selected point on the casting, which can be guaranteed as being consistent, and it is the responsibility of the inspection to advise in this matter. Castings cannot be produced 100 per cent. perfect to drawings and risers or loose pieces must be taken into consideration. A casting is usually marked out by the foundry proofing section and passed to the machine-shop planning department for tooling purposes.

FIG. 18.—THE CASTING SHOWN IN FIG. 19 AFTER SECTIONING.

When the pattern equipment is finally released to the foundry for production, the core and mould inspectors are informed and for the first few days a watchful eye is kept on the job. A project sheet giving all operations in detail accompanies the pattern equipment, thus allowing the job to proceed on production unhindered. It is the responsibility of the inspector to keep all concerned informed of the progress

of the job, especially when production increases. In respect of major castings, a detailed report is circulated daily.

As castings flow through the shop they are first inspected after knockout, this being called *hot inspection*, and its primary concern is to inform the moulding bay of any consistent faults such as porosity, shrinkage, blowholes and sandholes. This avoids any unnecessary sawing and fettling, and prevents further

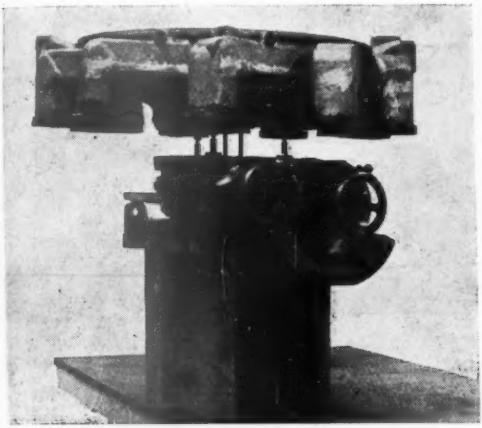


FIG. 19.—BLOWER CASTING SET UP ON ROTARY TILTING TABLE FOR INSPECTION.

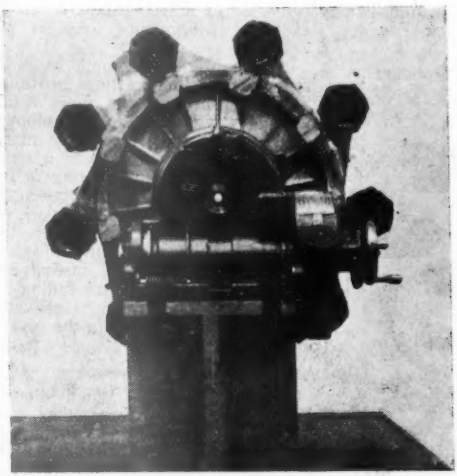


FIG. 20.—SHOWS THE BLOWER CASTING TILTED FOR EXAMINATION.

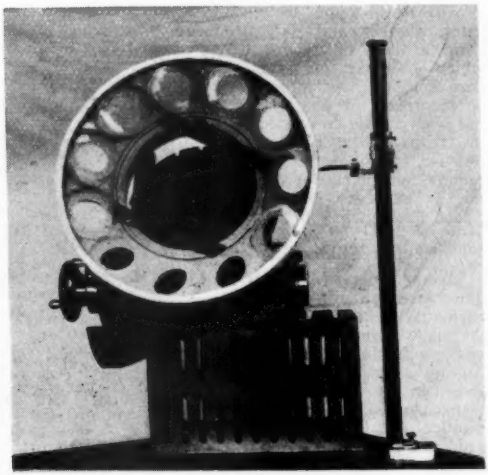


FIG. 22.—SHOWING A FURTHER USE FOR THE ROTARY TILTING TABLE.

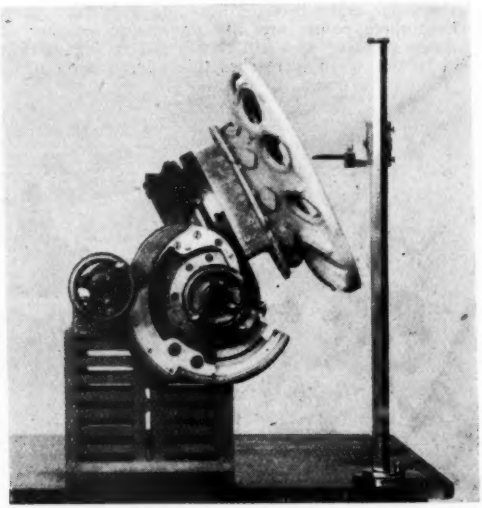


FIG. 23.—THE CASTING SHOWN IN FIG. 22 TILTED FOR PORT CENTRING

D

Inspection in a Mechanised Foundry

castings being produced with the same fault. All parts passing through this section are stamped with a serial letter, number and date produced, this being taken from a tally or record card which is made out after the part is cast. This information is recorded for material test purposes and is co-related with the furnace heat number and test-bar. The serial number remains on the casting throughout its existence and can be traced back at any time.

Camber Elimination

Several types of castings require a straightening operation, particularly in castings which are made in the form of a shell and are liable to distortion in cooling after cast. There is shown in Fig. 24 a bottom half crankcase being checked for camber on the joint flange. This is set up on two parallel slips from the cast face, and the back of the flange is being checked with scribing block.

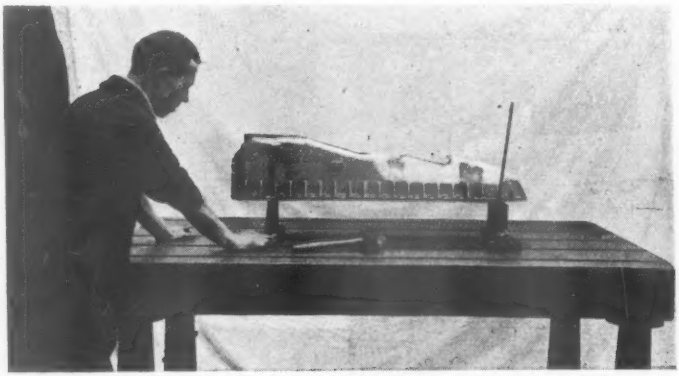


FIG. 24.—TESTING FOR CAMBER ON THE JOINT FLANGE.

A supercharger casing is shown in Fig. 25 being checked from a three-point location in the volute, the joint flange being brought into line with fixed gauge. These three points are also the major location for further checking and will certify the casting as being satisfactory when it reaches this operation. Castings found distorted are stretched with a hide mallet. Straightening is carried out before the pressure test or heat-treatment.

Pressure Testing

The next operation is the pressure test, which is carried out after sealing up all outlets, as will be seen in Fig. 26. The casting is then immersed in hot water at approximately 70 deg. F. and filled with compressed air to a pressure of 50 lbs. per sq. in., the casting remaining in the water for 15 mins. All parts having internal water jackets or oil-pressure passages are tested.

It is permitted in some cases to impregnate leaking castings providing these are only for the flow of air or oil ways, *e.g.*, intake elbows, induction pipes and induction manifolds, but these are kept to a strict minimum, as pressure testing is for foundry convenience only—again mainly to avoid unnecessary work on defective castings and to keep the production department fully informed of any faults. Numerous castings are fractured or X-rayed after failing on the pressure test, which provides valuable information as to the nature of the fault.

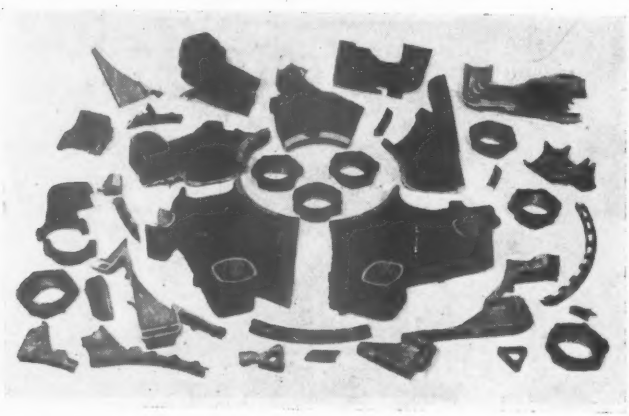


FIG. 21.—THE BLOWER CASTING SECTIONED INTO 36 PIECES.

Section Thickness

Castings then reach final dimensional inspection, where they are checked by every means possible on a rough casting, particular attention being paid to metal sections, this being checked by using figure 8 calipers, the thickness being read by means of

a graduated wedge, as illustrated in Fig. 27. The main profiles are checked with templates and castings are inspected generally for draws, blowholes, misplaced cores or anything which may prove defective in the course of machine-shop operations.

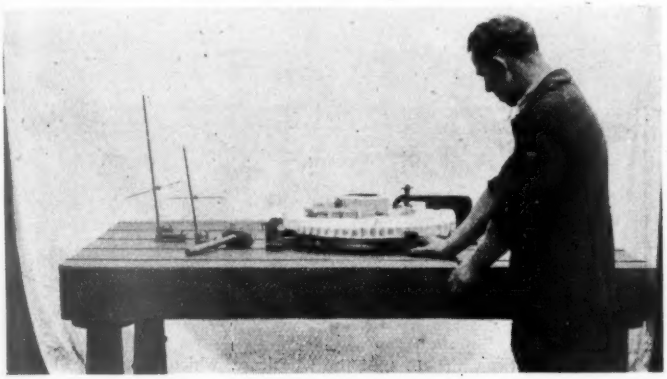


FIG. 25.—CHECKING A SUPERCHARGER CASING.

Manifold Castings

It is generally necessary to check castings, using the same location spots as are used in the machine shops, this is being done by the use of fabricated steel jigs. Fig. 28 shows a fixture which checks the selected location points on a manifold casting. As the casting is not marked out prior to machining, and has 15 internal bosses, five in each port, some form of guarantee must be given to machine shops that casting will be satisfactory. As internal bosses have to be as near to drawing size as possible, a 0.037-in. core misplacement will be sufficient to scrap a casting.

Fig. 29 shows the casting in the jig being located as on the machine-shop fixture, all bosses being checked in this position. Fig. 30 shows a rather bulky casting which is difficult to check by visual inspection. On the surface table is shown a jig for checking the ports in relation to the remainder of the casting. In Fig. 31 the casting is shown in position, the height of flanges being checked and also the position of the ports. The bar carrying profiles swings about its centre enabling all ports to be checked in relation to one another.

Engine Set Inspection

When one considers the production of approximately 500 engine sets per week, it is essential that a strict check be kept on the consistency of location points, otherwise a high percentage of scrap would be involved, especially when a large percentage of castings are not marked out prior to machining. This is one feature which has been eliminated in the Author's machine shops, thus affording the proper conditions for mass-production.

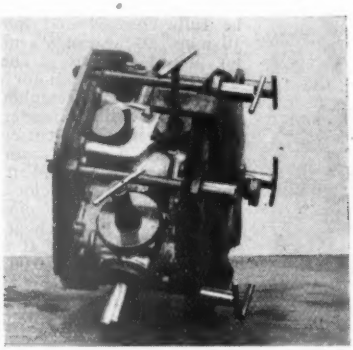


FIG. 26.—SEATING PRIOR TO PRESSURE TESTING.

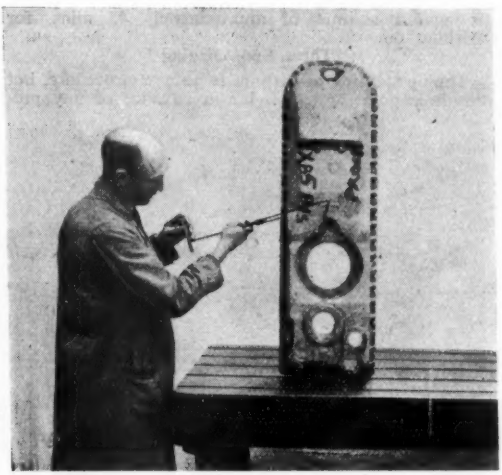


FIG. 27.—SHOWING USE OF CALIPERS FOR SECTION THICKNESS CHECKING.

Inspection in a Mechanised Foundry

All inspection personnel are fully A.I.D. approved, being conversant with drawings and Air Ministry requirements. Frequent checks of work passed are taken by the resident A.I.D. inspector in charge. After passing dimensional inspection and stamped accordingly, the castings, complete with test-bars, are subjected to heat-treatment, passing through a continuous bogie furnace at a temperature of 175 deg. C. for 12 hrs. This furnace is divided into 10 chambers, which are all pyrometrically controlled. The first position is a pre-heating chamber, the castings remaining here for one hour. They are then moved on automatically at hourly intervals until finally they reach the last chamber, which is a cooling chamber. After heat-treatment, castings are then stamped and passed to jig spot section.

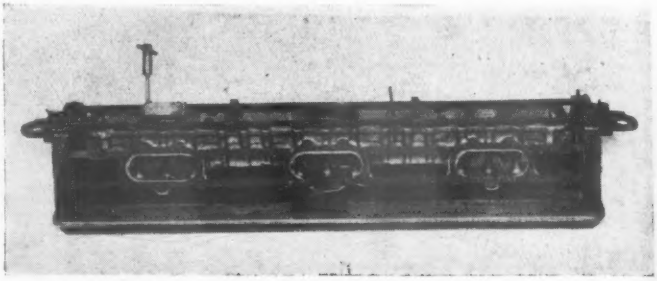


FIG. 29.—THIS JIG IS A REPLICA OF THE MACHINE SHOP FIXTURE.

The jig spotting of castings has become an essential operation in any foundry organisation, especially when castings are mass-produced. This operation not only guarantees that the casting will machine to drawing requirements, but also eliminates the lengthy process of marking out and obviates any possibility of the discrepancies which do occur in this process. Furthermore, a great saving in man-hours is attained due to a casting being jig spotted in approximately 8 mins., as against a time of approximately 45 mins. for marking out.

Three Spot Jigging

The jig spotting of castings is no new procedure, but the three point system is far in advance of any previously adopted. This consists of three drilled holes and spot faces, as shown in Fig. 32, these being sufficient for any machine operation in the vertical or horizontal plane. All fixtures are substantially made as illustrated in Fig. 33. This is the particular jig on which to spot the wheelcase, which is a very intricate casting. The jig boring bracket is air-operated for easy loading. Fig. 34 shows the casting located and profiles used for setting.

Fig. 35 shows the jig spot fixture being used for checking an intercooler box, with the boring bracket lifted. All fixtures are air-operated where possible, and in Fig. 36 will be seen the air cylinders for clamping the casting in the jig and also for lifting the top bracket. In Fig. 37 will be seen the top half crankcase jig fixture, which is very intricate and of sturdy design. Owing to its size, the casting is loaded through the end on rollers. The same casting is shown loaded in Fig. 38, but is rather difficult to see, owing to the numerous profiles and checking gauges. This casting can be fully checked and spotted in 10 mins., as against a semi-marking out of 45 mins. The cutter used in the operation for drilling and spot facing is combined and is set daily with a master gauge which guarantees the correct depth of spot facing on all castings. A further check is also taken by the use of a plug and clock gauge reading from the spot facing to the top of the bush, which acts as a stop for the arbor. The three faces can be guaranteed to 0.002 in. in the same plane. (See Fig. 39.)

Jig spot fixtures have the advantage of being able to check the casting in the vertical and horizontal plane in one setting, plus the fact that any defect can be discovered whilst the casting is in

FIG. 28.—FIXTURE FOR CHECKING A MANIFOLD CASTING.

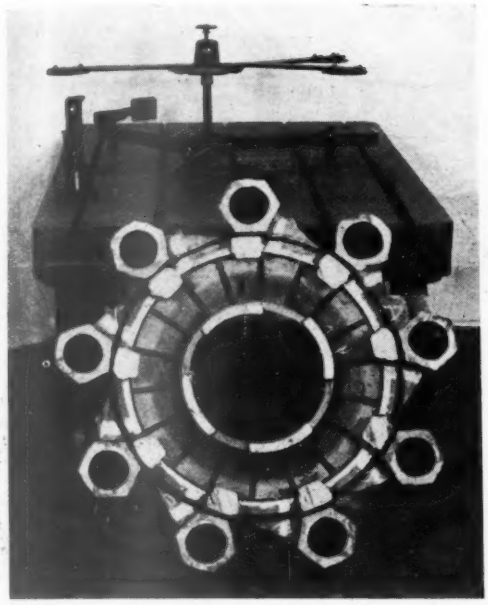


FIG. 30.—JIG FOR INSPECTING A BULKY CASTING.

its rough state, again avoiding scrap which may occur in the later stages of machining.

All fixtures are operated by semi-skilled labour, under the control of a skilled supervisor to whom all queries are pointed out. The fixtures are made as simple as possible and consist mainly of a base plate with as many profile plates as possible checking externally, the best being taken out of the castings, especially one which may be very intricate. The castings are placed on screw jacks which are adjustable and can bring the casting into line with all corresponding profiles. Any internal checking required is done from the base by gauges. Jig spotting is a boon to the machinist as all machines can be set for the operation required; this will also guarantee all parts being machined to the same size.

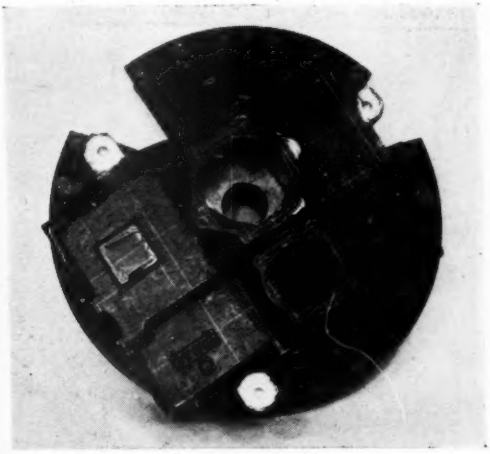


FIG. 32.—ILLUSTRATES AN EXAMPLE OF THE THREE POINT JIG SPOTTING SYSTEM

A Larger Location

Where a casting has in the region of 200 operations to bring it to its final stages, it is often necessary to create a further location than those supplied by the foundry, particularly where ¼-thousandth limits are required. For instance, on a Merlin cylinder head after the top and bottom faces have been machined, it is an advantage to create a larger location, this being

FIG. 31.—CASTING POSITIONED FOR INSPECTION.

Inspection in a Mechanised Foundry

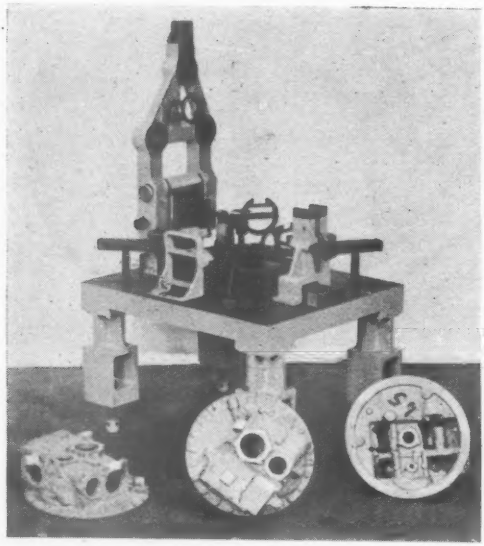


FIG. 33.—A TYPICAL FIXTURE FOR JIG SPOTTING.

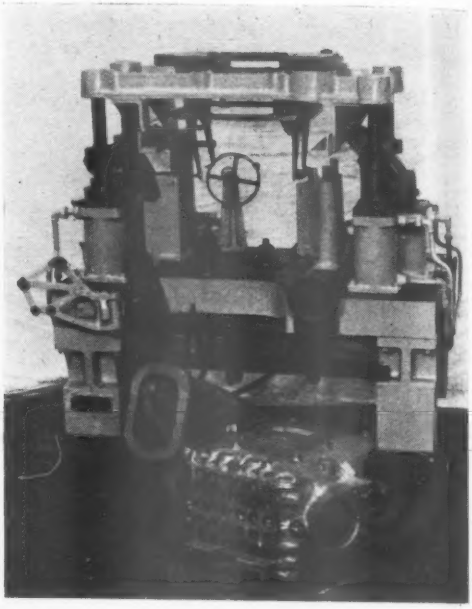


FIG. 35.—AN INTERCOOLER BOX CASTING SET UP FOR CHECKING.

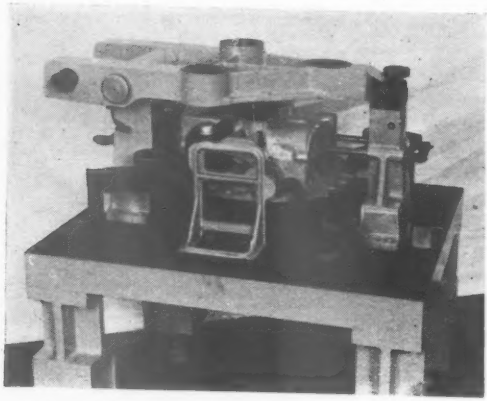


FIG. 34.—SHOWS A WHEELCASE MOUNTED ON THE FIXTURE.

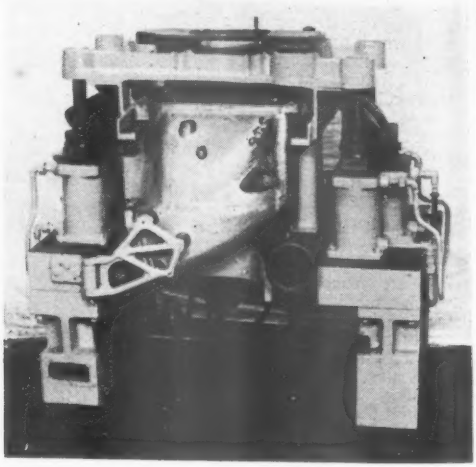


FIG. 36.—SHOWING THE AIR CYLINDERS FOR CLAMPING THE CASTINGS ON THE JIG.

produced by boring out combustion heads from the location holes supplied by the foundry. Two of these bores are then used for all further location, as these are approximately 6½ in. dia. and, therefore, a more accurate set is obtained and the chances of an accumulation of errors, due to the numerous operations, are diminished.

As a further safeguard and quick contact, liaison officers operate between foundry and machine shops and also between customers. It is their duty to investigate all troubles or hold-ups which may occur on the machine line. All scrap attributed to foundry faults is accepted by the liaison officers, who immediately inform the foundry department concerned. This sometimes necessitates the stopping of a job on production or a 100 per cent. X-ray on defective parts. The major troubles experienced are usually blowholes, shrinkage or porosity, which are revealed after machining operations.

Dimensional faults can be controlled to a minimum with the use of gauges, calipers, checking fixtures, etc., but even then it requires a rigid and watchful inspection organisation to prevent all the faults that "do," "can" and "will" occur in a foundry. •

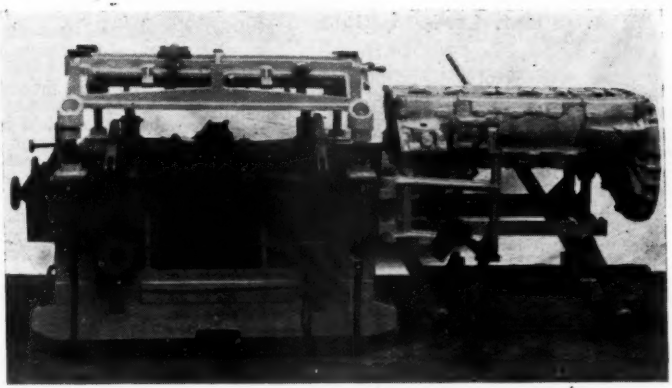


FIG. 37.—TOP HALF CRANKCASE JIG FIXTURE.

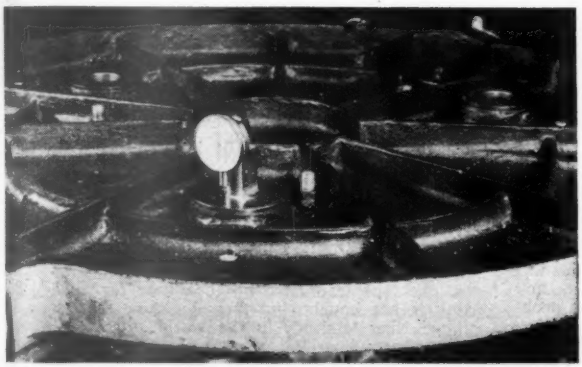


FIG. 39.—THE PLUG AND CLOCK GAUGE IN USE FOR CHECKING.

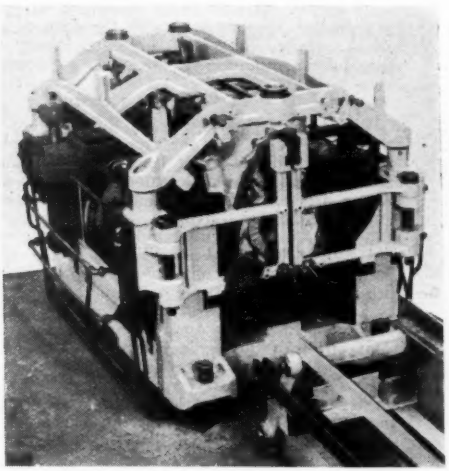


FIG. 38.—THE CASTING SHOWN IN FIG. 37 LOADED FOR CHECKING.

MR. R. E. CARPENTER has been elected to the board of Birfield Industries, Limited, in place of Mr. L. T. White, who has retired.

FIRST SOD on the site of a new Scottish factory which will give employment to 400 workers was cut in Kilmarnock recently at a ceremony sponsored by Scottish Industrial Estates, Limited. The factory is to be a branch establishment of the Glacier Metal Company, Limited, of Alperton, Middlesex, and is to be used for the manufacture of finished bearings, anti-friction metals, bronze castings, lead bronzes, and bronze bushes. It will have a floor space of 45,000 sq. ft.

THE LEAD CRISIS

By "ONLOOKER"

On the outbreak of the war the metal trade in this country waited with some anxiety for news of the stock position, for it was realised that as a manufacturing country dependent upon imports our situation might well prove to be difficult. Actually no information was forthcoming, for it was essential that the enemy should be kept guessing, but it was shrewdly suspected that in one or two directions we were not any too well placed. Fortunately, all the gaps were bridged, and so far as non-ferrous metals were concerned we ran throughout the war at high pressure without any hitch due to a lack of essential raw material—a very creditable performance on the part of the Ministry of Supply, which had to cater for a demand very much greater in some directions than normal. The consumption of copper and zinc increased out of all knowledge and, of course, aluminium was in that class also. Great efforts were made at the mines supplying the Allies and in the end the power of the Axis was shattered. But it is noteworthy that during the war years the usage of lead showed a reduction as compared with the days of peace, and, in the United States, at any rate, labour was transferred from mining lead to copper production.

Loss of Burma Output

When the Japanese overran Burma there was something of a flurry over the fact that we should be short of 90,000 tons or so of lead from the mines in that country, but it was understood that stocks were everywhere pretty comfortable and that no embarrassment was anticipated. Judgment on such matters was, of course, entirely in the hands of the authorities, for the strictest secrecy was maintained and the industry had no data on which to base conclusions. Following the blitz, there was quite a lot of remelted lead about and this was freely absorbed for a number of purposes for much of it was excellent in quality. So matters went on, with the trade getting what it wanted, and when the European war ended in May there were probably few among the manufacturers who had any uneasy thoughts about lead supplies. After all, why should they? Such problems had been taken out of their hands by a body familiarly called "The Control," their opinion and advice were not sought, and they had grown accustomed to the state of affairs in which a Minister assumed responsibiity for seeing that all the raw material needed was forthcoming as required. Halcyon days indeed!

To those who believed that bulk buying by the instrument of Government action was the sovereign cure for fluctuations in the prices of metals the first shock of disillusionment came about halfway through last year, when after weeks of rumour respecting zinc, the quotations both of that metal and of lead were advanced overnight by some £5 per ton. Whatever view may have been held in certain restricted circles occupied in studying the statistical data published in the United States, it seems pretty certain that the consumers of lead were not specially alarmed about this increase, and they certainly did not visualise for a moment that we might later come up against famine conditions.

By this time quarterly figures relating to United Kingdom consumption of non-ferrous metals were being published by the Ministry of Supply and from these it was seen that the lead figures, moving against the general trend, were registering an increase. With the end of the concentration scheme in the sheet and pipe industry, activity quickened and the demand for pig-lead went up. However, with the country getting down to a housing programme of unprecedented magnitude and all out for export business this was only to be expected.

Failure of Bulk Buying

Then in the autumn came disconcerting news of a world shortage of lead, a strike at the Mexican mines and insistent prophecies of another increase in the sterling quotation, which at £30 was, of course, well below the American parity. Then the bombshell. Ten days before Christmas the Ministry withdrew without warning from the market and the trade was left to do the best it could without any chance to cover its sales at a known price. To say that there was consternation would be an understatement. This was a thunderclap and the disciples of the cult of bulk buying put on sackcloth, but they did not expect to wear it long.

Actually it was more than four weeks before the authorities were ready with their second surprise in the shape of a £9 rise and a cut in the country's supplies of 20 per cent. Apparently something had gone wrong in bulk buying. This cut is to be reviewed every quarter, but it is doubtful if even a handful of the disillusioned industrialists has any hope of an improvement for a long time to come.

Harmful Gambling

That is how things stand, but, to employ a colloquial phrase, "Where do we go from here?" The consumers of lead have no idea how far ahead the Ministry has bought, but they do know that there is still a rising tendency in the world price. In these circumstances hoarding of secondary lead is likely to continue and the shortage is thus aggravated while a form of gambling develops much more harmful than anything seen on the Metal Exchange. In the past there have been world shortages of non-ferrous metals and quotations have risen as a result of protective buying on the London market, but—and this is the important point—there were always sellers at a price. Moreover, this country was never starved of its needs in physical supplies, partly because consumers made their own long-term arrangements with producers, but also because the market in London acted as a magnet. It must also be remembered that the big merchant houses were always prepared to take a view and buy for forward shipment. This could be done with a minimum of financial risk, as the terminal market was available for hedging. Would that we had such a form of insurance to-day!

THE GASSING OF BRONZES BY REACTION WITH MOULDING AND CORE SANDS

By W. T. PELL-WALPOLE, B.Sc., Ph.D.

(*Continued from page* 108)

Gassing Action of Sands Without Artificial Bonding Additions

Both the unsieved red sand and the fine (60-mesh) red sand, when baked at 300 deg. C., caused moderate to severe gas porosity (P_D 4.5-5.5) and low properties (Table III), but the sea sand had no appreciable gassing action, due clearly to its lack of natural bond and consequent complete freedom from moisture after baking. This sand had no adhesion and could not form a lining inside the pot as did the red sands. The tests were made by stirring the required weight of baked sand into the molten bronze.

A 50/50 mixture of unsieved red and coarse sea sands caused very slight gassing (P_D 2.4), much less than would be expected from the proportion of red sand present. This effect must be attributed to the action of the coarse sea sand in opening up the texture of the finer red sand, thus increasing its permeability and permitting some of the steam generated to escape through the sand instead of reacting with the bronze.

The coarse red sand (all retained by 60 mesh) caused very slight porosity (P_D 2.0) compared with the unsieved sand, though rather more than the sharp sea sands. There are three factors concerned in the relative action of these. Most of the clay is removed from the red sand by sieving, and its permeability is also greatly increased, but in distinction from the sea sands it had a certain amount of ferruginous bond, not affected by sieving. This must be responsible for the slight gassing produced.

Comparative tests carried out by a clean Salamander pot gave ingots completely free from gas porosity, with high density (8.76) and high mechanical properties (26 to 28 tons per sq. in., 20 to 30 per cent. extension). It should be noted that this density value represents about 1.0 per cent. porosity (caused by fine pinhole shrinkage cavities), hence P_W or P_D values of less than 2 per cent. have no real significance.

Gassing Action of Bonding Agents Without Sand

These tests (Table IV) were made with baking temperatures of 300 deg. C. for inorganic bonding materials, but the organic substances could not be baked above 150 deg. C. without swelling and breaking of the lining, which caused partial obstruction of the pouring aperture and invalidated the test.

Of the clay-type materials, fireclay (aluminium silicate with excess silica) and aluminous cement (aluminium silicate with excess alumina) caused severe gassing, while the pure colloidal clay caused very slight gassing only. The former materials therefore appear to retain more combined moisture after baking than does the pure colloidal clay. Water-glass also caused very severe gas porosity (P_D 14.0) in the bronze. This was probably due to decomposition of the hydrated silicate on heating to red heat by contact with the bronze, forming steam, which then reacts with the bronze to form hydrogen which is absorbed. Limonite (Fe_2O_3, xH_2O) caused moderately severe gassing, indicating that the ferruginous bond normally present in red moulding sands plays an important part in their gassing action on bronze, as was deduced from the test on coarse red sand without artificial bonding addition.

Of the organic bonding agents, the dextrin types, flour and linseed oil all produce moderate to severe gas porosity, while the commercial starch product and oil-starch product gassed only slightly, the latter being superior in this respect to any other bonding agent tested. The variation in action of these materials is probably due to their more complex reactions under test conditions, as compared with the inorganic substances. The latter give rise to only one possible

TABLE III.—*Gassing Action of Sands Without Artificial Bonding Additions. Baked at 300 deg. C. Melts poured at 1,250 deg. C.*

Sand.	Wet Wt. Grm.	Dry Wt. Grm.	Visual Signs of Gas Porosity.	Observed Density.				Tensile Values.				Gassing Index.		Analysis.	
						Upper T.P.	Lower T.P.	Upper T.P.		Lower T.P.					
				Head.	1½ in. Bar.			U.T.S.	El. Per cent.	U.T.S.	El. Per cent.	P_W	P_D	Sn Per cent.	P Per cent.
Unsieved red ..	83	62	Moderate ..	8.34	8.56	8.51	8.61	23.8	12	24.2	14	4.2	5.6	9.9	0.76
Coarse red ..	50	35	Very slight ..	8.73	8.75	8.76	8.75	27.8	29	23.6	12	1.4	2.0	10.0	0.73
Fine red ..	84	56	Moderate ..	8.42	8.62	8.49	8.67	21.0	16	24.7	15	3.0	4.5	9.9	0.77
Coarse sea ..	88	61	Very slight ..	8.71	8.75	8.80	8.76	27.8	34	26.0	24	1.0	1.4	10.1	0.72
50 per cent. red/ 50 per cent. sea	88	63	Slight	8.59	8.72	8.71	8.74	23.1	30	25.6	26	1.7	2.4	10.0	0.71
Blank	—	—	None									—	—		

The Gassing of Bronzes

source of gas, *viz.*, the liberation of chemically combined water. With the organic substances, which burn in contact with the molten bronze, in addition to the liberation of any combined water which may be present, water vapour may be produced as a product of combustion. It is also possible that carbonaceous gases produced at the same time may react with the bronze in the same manner as the water vapour.

Gassing Action of Sands with Additions of Artificial Bonding Agents

(*a*) *Unsieved Red Sand.*—The results of these tests are shown in Table V. Mixtures with inorganic bonding agents were baked at 300 deg. C., those with organic additions at 200 deg. C., as higher temperatures caused these substances to char, destroying their bonding properties. Of the clay-bonded mixtures those with aluminous cement or fireclay cause severe gassing, rather worse than the red sand alone, while the pure colloidal clay mixture causes only moderate gassing, appreciably less than the red sand alone.

The organic bond additions all give fairly similar results, producing only slight to moderate gas porosity. Thus small additions of these materials greatly reduce the gassing action of the red sand in spite of their severe gassing action when tested alone. This effect is due chiefly to the remarkable increase in permeability, which they produce in this particular grade of sand.

TABLE IV.—*Gassing Action of Bonding Agents.*

Material Tested.	Wet Wt. Grm.	Dry Wt. Grm.	Baking Temp. Deg. C.	Visual Signs of Gas Porosity.	Observed Density.				Observed Tensile Properties.				Gassing Index.*		Analysis.	
							Upper T.P.				Lower T.P.					
					3 in. Head.	1½ in. Bar.	Upper T.P.	Lower T.P.	U.T.S.	El. Per cent.	U.T.S.	El. Per cent.	P_W	P_D	Sn Per cent.	P Per cent.
Pure colloidal clay	51	26	300	Very slight	8.70	8.73	8.73	8.73	25.9	20	24.8	17	2.2	4.4	9.9	0.75
Fireclay	92	63	,,	Severe	8.41	8.48	8.42	8.55	18.0	6	22.4	12	4.4	6.6	10.0	0.70
Aluminous cement	90	60	,,	,,	8.40	8.61	8.52	8.62	20.0	7	23.8	17	3.3	5.0	10.0	0.75
Water-glass	50	30	,,	,,	8.41	8.46	8.32	8.70	13.6	3	23.1	14	8.4	14.0	9.2	0.72
Limonitic ore	53	38	,,	Moderate	8.59	8.63	8.61	8.61	25.6	21	25.2	22	4.3	6.0	10.1	0.71
Flour	50	25	150	,,	8.54	8.56	8.54	8.57	23.4	13	23.7	17	5.9	11.8	9.2	0.74
Pure dextrin	46	15	,,	Slight	8.57	8.64	8.67	8.64	26.5	22	24.8	16	4.6	13.8	10.0	0.75
Commercial dextrin	53	24	,,	Severe	8.47	8.52	8.52	8.52	24.0	15	22.1	11	6.6	14.5	10.1	0.75
Commercial starch	82	7.5	,,	Moderate	8.57	8.65	8.64	8.65	23.5	12	20.8	10	2.6	(28.6)†	10.0	0.76
Linseed oil	—	18	,,	,,	8.59	8.64	8.62	8.62	25.9	18	21.4	13	—	12.0	9.7	0.72
Oil/starch	47	9.5	,,	Very slight	8.70	8.71	8.70	8.67	28.5	33	25.6	17	2.3	(11.5)†	10.1	0.76

* Calculated value of percentage porosity (ideal value 8.82) produced by reaction of 100 grm. of material weight wet (P_W) or dry (P_D).
† Calculated values for 100 grm. not likely to be reliable when dry weight very low.

TABLE V.—*Gassing Action of Red Sand (Unsieved) with 5 per cent. Additions of Artificial Bonding Agents.*

Bonding Addition.	Wet Wt. Grm.	Dry Wt. Grm.	Baking Temp. Deg. C.	Visual signs of Gas Porosity.	Observed Densities.				Tensile Properties.				Gassing Index.		Analysis.	
							Upper T.P.				Lower T.P.					
					Head.	1½ in. Bar.	Upper T.P.	Lower T.P.	U.T.S.	El. Per cent.	U.T.S.	El. Per cent.	P_W	P_D	Sn Per cent.	P Per cent.
Pure colloidal clay	90	64	300	Moderate	8.49	8.62	8.53	8.69	22.8	8	23.6	15	2.9	4.1	10.3	0.74
Fireclay	85	57	,,	Severe	8.48	8.45	8.34	8.48	15.4	3	19.5	15	4.8	7.2	10.1	0.75
Aluminous cement	83	61	,,	,,	8.41	8.46	8.39	8.56	16.8	15	22.4	12	5.1	6.8	10.1	0.74
Water-glass	80	55	,,	Slight	8.66	8.64	8.65	8.62	25.9	20	23.2	12	2.5	3.6	9.8	0.74
,,	85	61	,,	,,	8.63	8.69	8.60	8.73	22.0	12	26.0	26	2.2	3.1	9.7	0.72
,,	88	63	,,	,,	8.59	8.66	8.70	8.75	25.2	21	22.4	13	2.3	3.2	9.7	0.74
Flour	91	61	200	,,	8.54	8.62	8.62	8.65	26.3	23	24.1	15	2.7	4.0	9.9	0.74
Pure dextrin	92	65	,,	,,	8.49	8.64	8.58	8.67	25.0	20	24.1	14	2.7	3.8	9.8	0.73
Commercial dextrin	90	64	,,	,,	8.61	8.60	8.60	8.65	24.4	18	25.2	22	2.8	3.9	9.9	0.75
Commercial starch	73	43	,,	,,	8.62	8.62	8.62	8.63	24.4	15	22.7	14	3.1	5.3	10.1	0.75
Linseed oil	88	65	,,	,,	8.59	8.64	8.62	8.62	25.9	18	21.4	13	2.4	3.3	9.8	0.72
Commercial oil/ starch	70	47	,,	Very slight	8.62	8.66	8.65	8.65	25.6	20	23.2	15	2.7	4.0	10.0	0.73

(*b*) *Coarse Red Sand.*—This sand was tested only with those bonding additions of each class which gave least gassing with the unsieved red sand. The results (Table VI) show that even these additions increase the gassing action of this coarse sand, most in the case of clay-bonds, least with the oil/cereal addition. The natural permeability of this sand is so great that it cannot be increased sensibly even by cereal-type bonding additions, while clay additions decrease it, and since its natural gassing action is lower than that of any of the addition agents, these all produce an increase in gassing. The results are not greatly superior to those for the corresponding mixtures with the unsieved sand, indicating that the natural disadvantages of a sand of low permeability such as this can be largely counteracted by using a bonding addition such as oil/cereal, which increases its permeability.

(*c*) *Sea Sands.*—Additions of 10 per cent. of fireclay or of limonitic ore to the coarse sea sand caused moderate to severe gassing (Table VII). Aluminous cement or pure colloidal clay in the same concentration had rather less effect, while a 5 per cent. waterglass addition caused only slight gassing. Cereal bonds were tested in 20 per cent. concentrations to

TABLE VI.—*Gassing Action of Coarse Red Sand with 5 per cent. Additions of Selected Bonding Agents.*

Bonding Addition.	Wet Wt. Grm.	Dry Wt. Grm.	Visual Signs of Gassing.	Observed Densities.				Tensile Properties.				Gassing Index.		Analysis.	
								Upper T.P.		Lower T.P.					
				Head.	1½ in. Bar.	Upper T.P.	Lower T.P.	U.T.S.	El. Per cent.	U.T.S.	El. Per cent.	P_W	P_D	Su Per cent.	P Per cent.
Pure colloidal clay* ..	82	55	Severe	8.52	8.50	8.40	8.52	17.2	13	22.0	11	4.4	6.6	10.2	0.72
Water-glass* ..	81	54	Very slight ..	8.67	8.71	8.69	8.72	25.6	20	23.8	18	1.7	2.5	9.8	0.75
Commercial starch ..	88	49	Moderate ..	8.59	8.55	8.56	8.53	24.6	20	22.4	13	3.3	6.6	10.0	0.74
Commercial oil/ starch ..	93	53	Slight	8.65	8.64	8.67	8.64	24.6	15	24.2	18	2.2	3.9	9.8	0.72

* Baked at 300 deg. C., others at 200 deg. C.

TABLE VII.—*Gassing Action of Sea Sand with Additions of Various Bonding Agents.*

Bonding Agent.	Wet Wt. Grm.	Dry Wt. Grm.	Baking Temp. Deg. C.	Visual Signs of Gas Porosity.	Observed Densities.				Tensile Properties.				Gassing Index.		Analysis.	
									Upper T.P.		Lower T.P.					
					Head.	1½ in. Bar.	Upper T.P.	Lower T.P.	U.T.S.	El. Per cent.	U.T.S.	El. Per cent.	P_W	P_D	Su Per cent.	P Per cent.
Pure colloidal clay, 10 per cent.	84	63	300	Moderate ..	8.54	8.67	8.65	8.68	23.6	14	27.0	28	2.4	3.2	10.0	0.76
Fireclay, 10 per cent.	85	64	,,	,,	8.52	8.64	8.65	8 75	23.5	12	22.4	11	2.8	4.2	10.1	0.69
Aluminous cement, 10 per cent.	92	68	,,	,,	8.60	8.63	8.60	8.62	26.3	21	23.8	11	2.5	3.7	10.3	0.75
Water-glass, 5 per cent. ..	91	61	,,	Slight ..	8.65	8.70	8.72	8.70	25.9	22	22.3	15	1.6	2.4	9.9	0.74
Limonite, 10 per cent.	83	62	,,	Moderate ..	8.50	8.62	8.65	8.73	24.4	16	23.1	13	3.1	4.2	10.0	0.74
Flour, 20 per cent.	100	67	200	,, ..	8.57	8.63	8.62	8.63	25.9	22	25.7	21	2.0	3.0	10.0	0.74
Commercial dextrin, 20 per cent.	85	60	,,	Very slight	8.72	8.66	8.70	8.65	26.2	21	24.8	15	2.0	2.8	9.9	0.75
Commercial starch, 20 per cent.	91	35	,,	Slight ..	8.65	8.67	8.68	8.69	26.8	24	22.7	21	1.9	4.8	10.0	0.74
Linseed oil, 5 per cent. ..	91	70	,,	Very slight	8.67	8.70	8.69	8.69	26.4	22	25.4	19	1.6	2.1	10.2	0.73
Commercial oil/ starch, 20 per cent.	90	45	,,	Slight ..	8.63	8.66	8.63	8.65	25.9	22	25.7	21	2.1	4.2	10.1	0.73
Commercial oil/ starch, 5 per cent.	82	55	,,	Very slight	8.65	8.70	8.71	8.70	27.4	27	25.5	20	1.8	2.7	9.8	0.73
Fireclay, 2½ per cent.; linseed oil, 2½ per cent.	86	72	,,	Moderate ..	8.60	8.61	8.62	8.61	26.2	23	22.3	10	2.5	3.0	10.1	0.73

The Gassing of Bronzes

produce the necessary bond strength for lining the coarse sand on to the test-pot. Moderate gassing was caused by flour, but the other materials caused only slight gassing. Linseed oil and the oil/starch bond could be used with as low as 5 per cent. additions, and both caused only very slight gassing.

caused much less gassing than the corresponding mixtures with red sand.

(*d*) *Red Sand/Sea Sand Mixtures.*—Those additions which gave good results with both red and coarse sea sands were tested as 5 per cent. additions to a 50/50 mixture of these sands (Table VIII). The results were very satisfactory, for the bond strength is much greater than that obtained with the corresponding sea-

TABLE VIII.—*Gassing Action of 50/50 Red Sand/Sea Sand Mixtures with Selected Bonding Additions.*

Bonding Addition.	Wet Wt. Grm.	Dry Wt. Grm.	Visual Signs of Gas Porosity.	Observed Densities.				Tensile Properties.				Gassing Index.		Analysis.	
								Upper T.P.		Lower T.P.					
				Head.	1½ in. Bar.	Upper T.P.	Lower T.P.	U.T.S.	El. Per cent.	U.T.S.	El. Per cent.	P_W	P_D	Sn Per cent.	P Per cent.
Water-glass, 5 per cent.*	88	63	Slight ..	8.60	8.64	8.57	8.67	26.2	23	24.0	15	2.4	3.6	10.0	0.75
Linseed oil, 5 per cent. ..	88	66	Very slight	8.64	8.72	8.71	8.72	26.3	24	22.9	14	1.5	2.0	9.9	0.74
Water-glass, 2½ per cent.; linseed oil, 2½ per cent.	78	58	Slight ..	8.60	8.66	8.71	8.64	26.8	26	23.5	15	2.5	3.4	10.0	0.73
Commercial oil/starch, 5 per cent.	86	48	Very slight	8.65	8.68	8.67	8.69	26.8	27	25.7	18	2.0	3.6	10.0	0.73

* Baked at 300 deg. C., others at 200 deg. C.

A mixture of fireclay 2½ per cent., linseed oil 2½ per cent., caused moderate gassing, but showed great improvement as compared with fireclay alone. This mixture gave a stronger bond, as judged by ease of adhesion to the pot, than any of the materials tested except the oil/starch addition. All mixtures tested

sand mixtures, while the extent of gassing is much less than with the red-sand mixtures. All gave ingots with high densities and mechanical properties, the oil/cereal mixture being slightly superior to the others tested.

(*To be continued.*)

FORTHCOMING EVENTS

(Secretaries are invited to send in notices of meetings, etc., for inclusion in this column.)

FEBRUARY 8.

Institute of Welding (*Birmingham branch*) :—"The Bronze Welding of Cast Iron," by G. G. Musted. At the James Watt Memorial Institute, Great Charles Street, Birmingham, 3, at 7 p.m.

Institute of Welding (*South-Western branch*) :—"Welding as Applied to Structural Work," by C. R. Harman.

Manchester Association of Engineers :—"Some Applications of the Elasticity of Natural and Synthetic Rubbers to Engineering Problems," by W. H. Reece. At the Engineers' Club, Albert Square, Manchester, at 6.45 p.m.

FEBRUARY 11.

Staffordshire Iron and Steel Institute :—"Gas Turbines and Jet Propulsion," by Dr. S. G. Hooker. Joint meeting with the Wolverhampton and District Engineering Society. At the Victoria Hotel, Wolverhampton, at 7 p.m.

FEBRUARY 12.

Institute of Welding (*Liverpool branch*) :—"X-ray for Welders." At the Technical College, Byrom Street, Liverpool, 3, at 7 p.m.

FEBRUARY 13

Institute of Welding (*Eastern Counties branch*) :—"Arc Welding," by C. A. Kershaw. At Ipswich.

Institute of Welding (*Manchester branch*) :—"Review of Modern Developments in Flame Cutting and Oxy-acetylene Welding Technique," by R. E. Doré. At Reynolds Hall, College of Technology, Manchester, at 7 p.m.

Institute of Welding (*North London branch*) :—"Fabrication Methods—Manipulators." At Watford, at 7.30 p.m.

Institute of Welding (*West Scotland branch*) :—Brains Trust. At 39, Elmbank Crescent, Glasgow, C.2, at 6.30 p.m.

Institute of Welding (*Sheffield branch*) :—"Welding Metals and Plastics," by Dr. Paterson. At the Royal Victoria Station Hotel, Sheffield, at 6.30 p.m.

FEBRUARY 14.

Institute of Welding (*N.E. Tyneside branch*) :—"The Control of Angular Distortion," by W. N. Kemp. At the Mining Institute, Neville Hall, Newcastle-upon-Tyne, at 6.15 p.m.

Scottish Engineering Students' Association :—Informal dance. At the Institution of Engineers and Shipbuilders, Glasgow, at 7 p.m.

Institute of British Foundrymen

FEBRUARY 9.

Scottish branch :—"Technical Records in the Foundry," by R. D. Lawrie. At the Royal Technical College, George Street, Glasgow, at 3 p.m.

West Riding of Yorkshire branch :—"Opportunities for the Foundry Technician in India," by J. Blakiston. At the Technical College, Bradford, at 6.30 p.m.

FEBRUARY 14.

East Anglian section :—Short Paper competition. At the Lecture Hall, Central Library, Northgate Street, Ipswich, at 6.45 p.m.

FEBRUARY 16.

Bristol and West of England branch :—"Patternmaking and Material," by G. W. Wearing. At the Merchant Venturers' Technical College, Bristol, at 7 p.m.

FEBRUARY 23.

Bristol and West of England branch :—"The Production and Application of Special Types of Cast Iron," by A. E. McRae Smith. At Gloucester.

East Midlands branch :—"Metal Shrinkage," by Dr. H. T. Angus. At the College of Technology, Leicester, at 6 p.m.

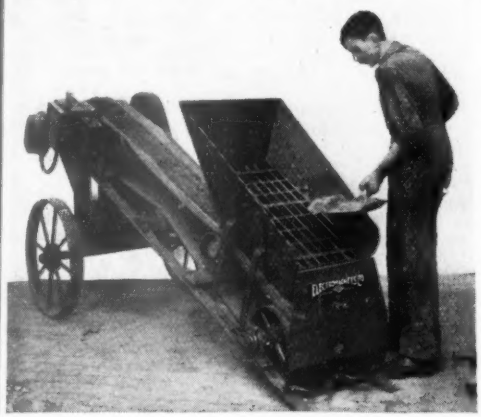
Wales and Monmouth branch :—"Consistency and the Cupola," by C. A. Payne. At the Engineers' Institute, Cardiff, at 2.30 p.m.

FEBRUARY 25.

Sheffield branch :—"Review of Sand-binding Materials and Compounds," by C. Wood. At the Royal Victoria Hotel, Sheffield, at 7 p.m.

A NEW SAND-CLEANING MACHINE

The plant shown in our illustration is being increasingly used in the foundry industry for the treatment of moulding sand. It is made by Electromagnets, Limited, of Bond Street, Birmingham, 19, and handles 3 tons per hour. The grid permits all lumps to be



broken down, whilst the magnetic pulley at the terminal head efficiently extracts all nails, brads, slashings, and the like. The plant is self-contained and merely requires to be switched into the nearest point on a 3-phase a.c. circuit. The machine is so well balanced that it can be easily transported by a boy.

STEEL PRICE INCREASE

At Question Time in the House of Commons MR. COBB asked the Minister of Supply and of Aircraft Production (1) the reason for the recently announced increase in the selling price of steel; and whether the effect that this would have on increased costs throughout industry generally had been taken into account; (2) whether the increase was based on the performance of the most efficient low-cost producers, or on that of the inefficient high-cost producers.

MR. WILMOT: The recent increase in the selling prices of steel was made necessary by the termination of the main wartime arrangements for stabilising prices which had involved subsidies to meet increased costs of production. The new prices are based on a review of costs of a representative sample of each section of the industry, in which special weight was given to the costs of the more efficient firms and to anticipated economies resulting from the return to normal supplies. The effects on consuming industries were fully considered before prices were raised.

DOMESTIC HOT-WATER SUPPLY BOILERS FOR SOLID FUEL

The generally accepted importance of domestic building at the present time lends particular interest to the revision of B.S. 758, "Small Domestic Hot-water Supply Boilers for Solid Fuel," which has just been published by the British Standards Institution. The Specification, which supersedes B.S. 758, Parts 1, 2 and 3, covers the fire-pots type of solid-fuel fired small boilers primarily intended for direct domestic hot-water supply. It deals with the rating, fuel capacity, heating surface, fire grates, dampers, materials and construction, and in addition gives the method of testing boilers for the determination of water heating efficiency at rating and an overload test.

The main differences between the requirements of the original specification and the revision are that (*a*) the latter requires an increase in the minimum fuel capacity of the smallest size boiler in order to ensure satisfactory banking, and (*b*) more stringent requirements which included air control. It is fully appreciated that the many improvements called for in the new specifications can only be brought into full operation when materials and labour are available for this purpose. Copies of the specification are obtainable from the British Standards Institution, 28, Victoria Street, London, S.W.1, price 3s. 6d. post free.

ALUMINIUM EXHIBITIONS

An Aluminium Exhibition opened to the public in Manchester on January 31 at Lewis's, Limited, Market Street, and will remain open until February 23. Newcastle-upon-Tyne will follow when an exhibition will be installed at Fenwick's from April 3-20. Up to date, half a million people have seen the exhibition elsewhere and manufacturers who are contemplating using light alloys or who have prototypes of domestic appliances and utensils, furniture or other products are invited to communicate with the Aluminium Development Association, at 67, Brook Street, London, W.1.

A USEFUL INSTRUMENT

The measurement of foul gas pressures presents difficulties on account of the tendency for tar to be deposited into the measuring instrument. A simple and effective form of tar extractor has been developed by the Metronic Instrument Company, Limited, of 196, Grove House, Smethwick, 40, Staffs, for use with Type 141 single column pressure gauges. The extractor can be cleaned out in a matter of two or three minutes, and this operation is necessary about once a month if the gauge is reading continuously 24 hours per day.

THE FRENCH FOUNDRY INDUSTRY again finds itself in a somewhat chaotic condition, because the system whereby the concerns worked on licences and priorities according to their customers has now been suppressed. In its stead a system of quotas for raw materials based on earlier consumptions has been imposed.

MANUFACTURERS WANT "FREE ENTERPRISE"

INITIATIVE CANNOT COME FROM WHITEHALL

Manufacturers are demanding that industry shall be left free to plan and direct its activities in the interests of the community. An outspoken article in the official journal of the National Union of Manufacturers (just issued to members) states:—

"It is neither reasonable nor commonsense to expect to find in Whitehall that spirit of enterprise, that readiness to take risks, and that power to take quick decisions which are absolutely essential qualities for the successful working of industry, specially in the export trade. Our Civil Service—the best in the world—has been built and trained for totally different purposes, and the machine of a big Government department is bound to work slowly. To expect it to run industry and to compete with any hope of success in overseas trade is to place the Service in a false position and to risk disaster.

"The National Union believes that the days are far too serious to begin excavations under the foundations of a machine which may creak here and there, but which was efficient enough to carry the British armed forces from Dunkirk to Berlin and Tokio. The weapons which made victory possible were designed in the workshops of Britain. In numberless cases, the heavy responsibility for their development and production was placed in the hands of the medium and small firms who had never previously undertaken similar work, but whose qualification to do so was inherent skill and adaptability, which is now in danger of being suffocated by the weight of Government orders and committees.

"To-day, Britain is facing an industrial Dunkirk and nothing short of the effort we then made will start us on the long road to our rightful place in world trade. The policy of the National Union is clear, and simple. It requires that those who carry the heavy burden of responsibility for the well-being of British industry shall be left as free as possible to plan and direct it in the best interests of the whole community, adding to all that past experience has proved to be worth while, the best of new methods and building an ever-closer co-operation between management and labour. It requires also that industry shall be consulted in the early stages of proposed legislation affecting industry and not when the Government has so far committed itself to principles that only details remain for discussion. The National Union believes that industry is greater and wider than any party consideration, for at its root industry is not inanimate—money, machines and balance sheets—industry is the great majority of the people of this country and on its conditions depends the happiness and well-being of us all. It is to be hoped that no Government will overlook this fundamental fact."

THE EYRE SMELTING COMPANY, LIMITED, of Tandem Works, Merton Abbey, London, S.W.19, have available for our readers two wall calendars. One carries specifications and some technical data for non-ferrous alloys and the other white metal for bearings.

SHEET METAL TECHNOLOGY

The sheet metal industries include many thousands of firms, large and small, in all parts of the country. The Sheet and Strip Metal Users' Technical Association has been formed to ensure the fullest use of the latest scientific and technical knowledge. Sheet metal enters into the daily life of the community. It is part of the amenities of civilisation and the defence of same. Kitchen, bathroom and household equipment, the proverbial pots and pans, and motor-cars, in peace; in war, aeroplanes and such as "Pluto." From Atlantic liners on the ocean to the kettle on the hob, may be said to be the range and scope of the uses of sheet metal.

Plans for research on a large and constant scale have been announced and are under way. The Department of Scientific and Industrial Research, which is under the ægis of the State, the British Iron and Steel Research Association, and many other bodies, are already in pursuit of further and fuller knowledge. The State recognises that the benefits should not be confined to any one firm but should accrue to the nation as a whole. The Sheet and Strip Metal Users' Technical Association supports that view. Full use will be made of the results of investigations and experiment; practical difficulties occurring daily in the works will be brought to light; knowledge will be widely disseminated in the British metalworking industries. The new Association will be non-profit making. A nominal fee (£3 3s.) for membership is charged. Dr. G. L. Kelley (Pressed Steel Company, Limited) is chairman of the Provisional Council. The headquarters are at 49, Wellington Street, Strand, London, W.C.2.

I.V.E. LONDON SECTION REORGANISED

At a meeting of the London section of the Institute of Vitreous Enamellers, held on January 29, at the Charing Cross Hotel, London, W.C.2, the 40 odd members present elected Mr. A. McLeod, Editor, "*Sheet Metal Industries*," as chairman. Mr. J. S. Barry (Stewart & Gray, Limited, Swains Road, London, S.W.17) is to be the honorary secretary. It was decided to resume activities forthwith on the pre-war state. Thereafter the meeting listened to an important and interesting lecture by Mr. Percy Stone on the present and future prospects of the vitreous enamelling industry. This was followed by an interesting account by Mr. J. T. Gray of his recent visit to Scandinavia.

CHAIN CABLE CONTROL

The Chain Cable Control of the Admiralty announce the termination of the control over the production and allocation of shackles as from December 31, 1945. From that date all manufacturers of shackles are free to accept orders without the necessity of obtaining a permit from the Chain Cable Production Officer. Iron and steel authorisation for the manufacture of shackles will continue to be issued to manufacturers by the Chain Cable Production Officer. The Shackle Distribution Scheme, whereby firms in certain areas were selected to hold stocks of Admiralty-owned shackles to meet sudden urgent requirements, was ended on November 30, 1945.

The High-Quality Iron for High-Duty Castings.

Made in seven standard grades or to individual requirements, this iron has a close grain structure and fine graphitic carbon content. It replaces Hematite, and tones up high phosphorus irons.

We also make Dale Refined Malleable Iron to any required specification.

OBITUARY

MR. THOMAS SIDDLE, director of T. Siddle & Sons (Engineers), Limited, of Leeds, died recently, aged 68.

MR. FRANK ROEBUCK, managing director of the Hepworth Iron Company, Limited, died on January 26 at the age of 66.

MR. ROLAND DAVID SHEARD, late managing director of Spurr, Inman & Company, Limited, boiler makers, of Wakefield, died recently.

MR. THOMAS LIVINGSTONE LACE, J.P., of Wigan, who died on January 21, aged 85, was at one period proprietor of the Atlas Forge, Ince.

MR. SAM GLADWIN, chairman and managing director of Gladwins, Limited, cutlery, etc., manufacturers, of Sheffield, died recently, aged 61.

MR. JOHN CHARLTON TEASDALE, chairman of Teasdale Bros., Limited, agricultural engineers, of Darlington and Stockton, has died at Darlington, aged 76.

MR. WILLIAM RICHARDSON, who has died at his home at Sunderland at the age of 81, had been secretary of Sir James Laing & Sons, Limited, shipbuilders, Sunderland, for 30 years.

MR. W. MELLIS, of Russell Street, Falkirk, who was employed as a patternmaker by Mitchell, Russell & Company, Limited, Chattan Foundry, Bonnybridge, Stirling, died in the foundry on January 30, following a seizure.

MR. J. W. PATTERSON, formerly head of the metallurgical department of the Central Marine Engine Works (W. Gray & Company, Limited), West Hartlepool, has died at Middleton-in-Teesdale. He retired in 1938.

MR. WILLIAM ROBINSON, manager of the wire works of Dorman, Long & Company, Limited, for many years, has died at Middlesbrough. He was previously with the Shropshire Iron Company, Limited, of Hadley. He was 82.

MR. F. PARKINSON, chairman and joint managing director of Crompton, Parkinson, Limited, and the associated group of companies, died suddenly at his home, Sunninghill, Berkshire, last week, at the age of 58. He founded F. Parkinson & Company at Leeds in 1908 to manufacture alternating current motors. In 1913 he was joined by his brother, Mr. Albert Parkinson, and the firm was later known as F. & A. Parkinson, Limited. In 1927 an amalgamation was arranged with Crompton & Company, Limited, and thus was founded Crompton, Parkinson, Limited, the beginning of a group of companies of which the best known are the British Electric Transformer Company, Limited, Derby Cables, Limited, Young Accumulators, Limited, Electricars, Limited, and A. E. Morrison & Son, Limited. In 1939 Mr. Parkinson was invited to the Ministry of Supply to organise the electrical equipment of ordnance factories. Then he was appointed Deputy Director-General of Contracts. He also built, equipped, and operated a large small-arms factory at Doncaster. Trained at Leeds University, he gave £50,000 for the establishment of a scholarship endowment fund and £200,000 for the building of a central administrative block there, and the honorary degree of LL.D. was conferred upon him.

PERSONAL

MR. E. R. DAVIES, Director of Research, Kodak, Limited, has been appointed hon. treasurer of the Institute of Physics to succeed the late Major C. E. S. Phillips.

MR. H. E. GEORGE, for 23 years sales manager of W. T. Flather, Limited, Standard Steel Works, Sheffield, has retired. Presentations were made by the directors and staff.

MR. A. CHESTER BEATTY, JUN., and DR. W. T. GRIFFITHS have been appointed directors of the Anglo Metal Company, Limited. MR. R. L. PRAIN has been elected chairman of the company.

MR. CHARLES E. CHANDLER, of Baxendale & Company, Limited, has been appointed chairman for the ensuing year of the Leith Metal Merchants' Association. MR. THOMAS YOUNG has been appointed secretary.

MR. C. TAYLOR, retiring works manager of J. G. Stein & Company, Limited, Castlecary, Stirlingshire, has received a presentation from the staff and employees. Mr. Taylor has completed 48 years in the service of the firm.

MR. J. C. PITCHFORD has retired from the position of managing director of Richard Lloyd, Limited, Birmingham. Messrs. C. J. Stayt and R. H. Higgs, formerly assistant managing directors, are now joint managing directors.

MR. FRANK SUTTON has been appointed chief engineer to British Filters, Limited, of Maidenhead. He took up his new duties on February 1. Mr. Sutton has been an active member of the Wales and Monmouth branch of the Institute of British Foundrymen.

MR. F. W. BAKER has been elected chairman of Ransome & Marles Bearing Company, Limited, in place of the late Sir Albert Bennett. MR. E. W. SENIOR, chairman and managing director of George Senior & Sons, Limited, has been appointed to the board.

MR. IAIN MAXWELL STEWART has been appointed managing director of Thermotank, Limited, and of the Thermotank Engineering Company, Limited. He joined H.M. Forces in September, 1939, served with the Royal Armoured Corps, and was evacuated at Dunkirk. In 1941 he returned to Thermotank, Limited, and filled the vacancy of director and general manager caused by the death of his brother, Mr. W. A. F. Stewart.

MR. ROLAND FINCH, joint managing director of Imperial Chemical Industries' Metals Division, retired as from January 1, thus closing a career of 43 years' active association with the British non-ferrous metals industry. Mr. Finch has held the post of joint managing director of I.C.I. Metals since 1936. He will remain in touch with the non-ferrous metal industry. He is a member of the Grand Council and of the Export and International Relations Committee of the Federation of British Industries. He is also a member of the Council and Executive Committee of the British Non-Ferrous Metals Federation, and chairman of the International Relations Committee.

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NEWS IN BRIEF

THE HOFFMAN MANUFACTURING COMPANY, LIMITED, of Chelmsford, is to open a factory near Glasgow for making ball and roller bearings.

UNITED ALUMINIUM FOUNDRIES, LIMITED, is being wound up voluntarily. Mr. W. Menzies, 15, Moorgate, London, E.C.2, is the liquidator.

WILLFORD & COMPANY, LIMITED, spring makers, of Sheffield, a subsidiary of Jonas Woodhead & Sons, Limited, Leeds, are erecting a factory in Scotland.

A JOINT TRADE COMMITTEE of the Association of British Chambers of Commerce and the Federation of British Industries has been set up to formulate a joint national policy on overseas economic questions.

TO MEET CONTRACTS obtained during a recent trip to America, Mr. W. Lindsay Burns, managing director of Henry Balfour & Company, Limited, Leven, plans considerable extensions to Hillside Foundry at Burnside, Cupar.

J. & R. WALKER BROS., Burnbank Foundry, have been granted permission by Falkirk Dean of Guild Court to erect a new foundry and general offices for dealing with ferrous and non-ferrous castings, at an estimated cost of £2,500.

WHILE SUPERVISING a process of metal extrusion at a Stechford works recently, William Roy Shorrocks, a 21-year-old trainee metallurgist, was injured by a sudden eruption of molten metal. He died in a Birmingham hospital nine days later after an operation.

THE IRON TRADES MUTUAL INSURANCE COMPANY, LIMITED, has been registered as a private concern with a nominal capital of £500,000 in £1 shares. The directors are to be appointed by the subscribers, which include the Iron Trades Employers' Insurance Association, Limited.

TUBE INVESTMENTS, LIMITED, announce the development on entirely new principles of construction of a range of all-metal, featherweight sailing and pram dinghies and folding punts for export and the home market. Prototype models of the new boats, which are designed for low-cost mass production, have been constructed at the Reynolds Tube Works at Tyseley, Birmingham. Commercial production will be undertaken by established boatbuilders.

THE SCOTTISH LIGHT-CASTINGS INDUSTRY is showing marked signs of revival. The shortage of skilled moulders is, however, restricting production in the Falkirk trade rather sharply, and it will take some time to remedy this shortage. Even experienced moulders who have been away for some years on national service or with the Forces will need a little time to get themselves tuned up to their jobs once more, as moulding is something of an art as well as a trade.

THE ASSOCIATION OF BRITISH CHAMBERS OF COMMERCE looks with strong disfavour upon the extension of the State's incursions into industrial activity. In a statement this week, it views with genuine misgiving the Coal Industry Nationalisation Bill now before Parliament. Every industry throughout the country will be affected by the provisions of this Bill, if enacted. If coal is not produced in greater quantities and at cheaper prices, the future of all our industries will be jeopardised.

THERE IS NO EXEMPTION from purchase tax in favour of surplus stores disposed of by Government departments, whether the goods are new or used, and registered persons are liable for tax in the ordinary way when they sell such goods or appropriate them to the purpose of retail trade or other taxable purposes. Registered persons buying such goods as stock for resale or materials for manufacture should accordingly make the usual representation to that effect in order to obtain the goods at a tax-exclusive price.

AN EXHIBITION to make known the war production efforts of local industries and to promote their change-over to peacetime manufactures is being organised by the Acton Chamber of Commerce, London. A factory building of 40,000 sq. ft. (at the Renault works) on Western Avenue, has been de-requisitioned by the Ministry of Aircraft Production for the exhibition, which will be opened by Mr. John Wilmot, M.P., Minister of Supply, and will run from March 4 to March 9. Over 60 firms will be represented.

MR. S. P. LOOSEN, presiding at the annual meeting of the Anti-Attrition Metal Company, Limited, disclosed that their London works, which were in a very vulnerable position, got repeatedly hit during the war. They therefore acquired a site at Maidenhead. They started digging the first week of January, 1941, and by the first week in August of that year they made their first delivery. In the last year of the war they completed 2,250,000 machined and finished parts for aeroplanes, tanks, and other war equipment.

IN MAY, 1943, the Government entered into agreements with the Performing Right Society, Limited, and Phonographic Performance, Limited, by virtue of which the performance, whether by broadcast means or otherwise, of music and gramophone records could be given in a wide variety of industrial premises without payment of individual licence fees. These agreements expire on February 24, and firms and organisations proposing, after that date, to use the facilities hitherto available under the agreements, must make appropriate arrangements direct with the Performing Right Society, Limited, 33, Margaret Street, London, W.1, or Phonographic Performance, Limited, 144, Wigmore Street, London, W.1.

CO-ORDINATION OF RESEARCH AT STAVELEY

The Staveley Coal & Iron Company, Limited, have decided to co-ordinate all their chemical and metallurgical research. To achieve this, a Central Research Department is to be established, which will include the research activities of the subsidiary company, Bradley & Foster, Limited, of Darlaston. The new department will be located at Staveley Works, near Chesterfield, and will be known as the Staveley/Bradley Foster Research Department. Dr. J. H. Hurst, technical director of Bradley & Foster, Limited, has been appointed Director of Research to the Staveley Company and the new Department will be under his direction.

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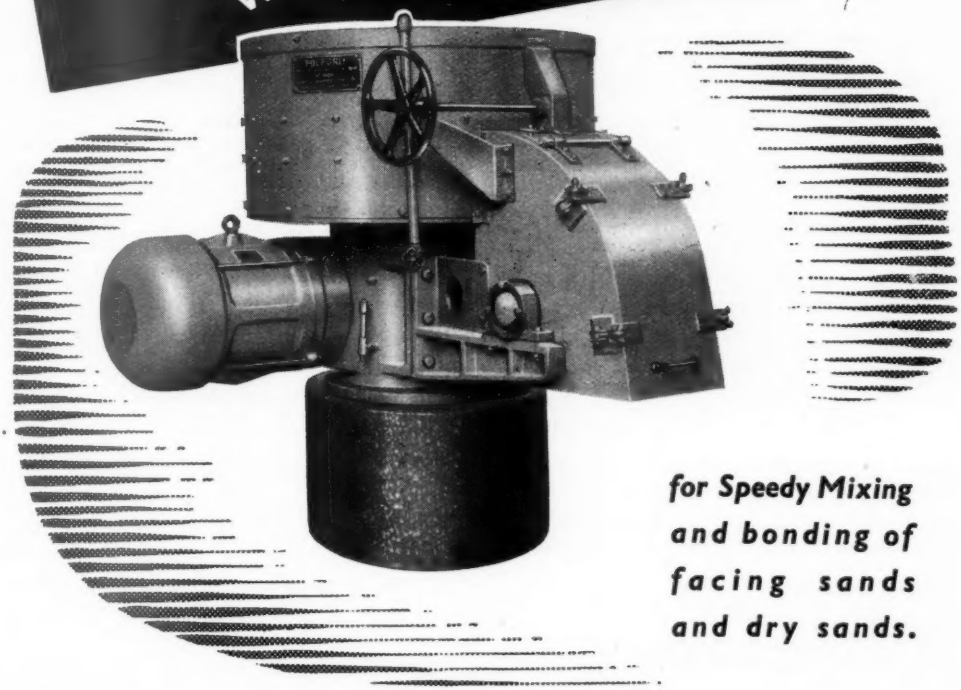

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SOLE AGENTS :

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NEW COMPANIES

("Limited" is understood. Figures indicate capital. Names are of directors unless otherwise stated. Information compiled by Jordan & Sons, 116, Chancery Lane, London, W.C.2.)

Metal Designers, 146, Bishopsgate, London, E.C.2—£100. C. S. Furman.

Atlas Brassfoundry (Birmingham), 6-11, Mott Street, Birmingham, 19—£8,000.

Almondsbury Engineers, 44, Coen Street, Bristol.—£6,000. J. J. and G. Davies.

Wharfside Foundry Company, 125, Seventh Avenue, Manor Park, London, E.12—£4,000.

Langport Agricultural Engineers, North Street, Langport, Som.—£500. W. R. and H. M. Trout.

Alloys Treatment—£500. F. J. and G. J. Fisher, 37, The Heights, Northolt Park, Greenford, Mdx.

Collins, Bagley (Engineers), River Street, Derby—£5,000. E. D. Collins, S. A. and B. L. Bagley.

Redic Precision Engineering Company, 117, North Street, Romford—£3,000. E. and M. Whitehead.

Northey Rotary Compressors, 20, Parkestone Road, Poole—£15,000. A. J. Northey and H. H. Lawrence.

Cope Chuck & Engineering Company, 542, Job's Lane, Coventry—£2,000. W. C. Cope, and D. E. Lane.

Sykes Bros. (Engineers), 1-5, Broad Street Place, London, E.C.2—£2,000. G. W., J. C., and A. H. Sykes.

Weybridge Jig & Tool Company, 159, Stoke Newington High Street, London, N.16—£1,000. H. H. and B. Poster.

Winchcomb Engineering Company, Footbridge, Irely Road, Winchcomb, Glos—£1,000. A. and F. E. Turner.

H. Bushell & Sons, 37, Tanner Row, York—Agricultural engineers, etc. £15,000. R. and G. M. Bushell.

Jenco Engineering Company, 43, Castle Street, Hinckley—£1,000. G. H. Taylor, A. A. Jenkins, and J. Fletcher.

Super Engineering (Warwick), 3a, Gunnery Terrace, Leamington Spa—£2,000. A. C. Scothern, A. S. and J. A. Stokes.

A. & S. Files, 56, Jessop Street, Sheffield—File and tool manufacturers, etc. £2,000. H. C. Strong and J. E. Appleby.

Newsum Engineering, Rutland Street, Ilkeston, Notts—£10,000. J. A. and K. N. Potter, W. G. Gaskill, and G. W. Hatton.

S. A. Monk (Sutton-in-Ashfield), Mansfield Road, Sutton-in-Ashfield, Notts—Precision engineers. £20,000. S. A. and L. Monk.

Bramson & Blades—Aluminium founders. £6,000. C. H. Treble, 15, Maybank Avenue, Sudbury, Wembley, subscriber.

Thanet Industries, 57, Byron Road, Wealdstone, Mdx.—Engineers, toolmakers, etc. £2,000. E. T. McNally and H. Leggett.

Unit Assemblies, 63, Occupation Street, Dudley—Welders, engineers, etc. £1,000. F. A. Fanthom, C. N. Stokes, and J. E. Lowndes.

S. & A. Worby (Barnet), 1, Burleigh House, High Road, London, N.20—Engineers, founders, etc. £1,000. S. E., A. L., and S. A. Worby.

G. H. Whitehouse & Son, 69, Horseley Heath, Tipton, Staffs—Mechanical engineers, etc. £10,000. H. C. and K. N. Whitehouse.

Warner & Weston—Manufacturers of and dealers in engineering plant, etc. £500. R. Terry, 16, Wrights Lane, Kensington, London, W.8.

G. H. Langley, 9, East Parade, Leeds, 1—Engineers, iron and brass founders, etc. £2,000. G. H. Langley, A. E. Sutcliffe, and C. L. Rothera.

Church & Bramhall, Imperial Buildings, Bridge Street, Walsall—Scrap metal merchants, etc. £5,000. F. W. G. Church, and L. Bramhall.

Morgan Metal Treatments, 6, Cherry Street, Birmingham—£10,000. G. J. Hammett, W. J. Sutton, C. T. Walker, H. E. and A. S. Morgan.

Sandelec, 46a, Finsbury Square, London, E.C.2—Manufacturers of and dealers in engineering products, etc. £1,000. K. Graham and S. Frais.

V. Brooks & Company, 23, Broad Street Avenue, London, E.C.2—Mechanical and general engineers, manufacturers of metal goods, etc. £999.

Winworth Gauge & Tool Manufacturing Company, 67-8, Jermyn Street, London, S.W.1—£5,000. R. M. Clean, E. W. Byworth, and R. H. Windsor.

Thormont & Company, 59, Burnt Oak Broadway, Edgware—Electro, nickel and chromium platers, etc. £1,000. L. G. Thorp and L. J. Montgomery.

Henry Wood (Five Ways), 37a, Haven Green, Ealing, London, W.—Stampers, piercers, aluminium founders, etc. £1,000. H. W. W. Williams.

Ash Meade & Company, 76, New Cavendish Street, London, W.1—Manufacturers of and dealers in machine moulds, matrices, jigs, tools, etc. £1,000.

Sleigh & Wood, 12, North Terrace, Newcastle-upon-Tyne—Manufacturers of and dealers in electrical plant and appliances, etc. £3,000. L. and H. C. Charlton.

Victortex (Burnley), 7, Hargreaves Street, Burnley—Manufacturers of and dealers in textile machinery, founders, engineers, etc. £1,000. W. and V. Smith.

N. Dean & Company, 2, College Street, Swindon, Wilts—Electrical and mechanical engineers, etc. £15,000. N. and L. Dean, J. B. and V. E. R. Lovegrove.

Hygroequipments—Designers and manufacturers of deep well and other pumps, etc. £6,000. R. H. Dickinson, 17, The Avenue, Old Windsor, Berks, subscriber.

Tool & Die Heat Treatment Company, Tinsley Park Road, Sheffield—£3,000. To instal and operate plants for the heat-treatment of metals. J. H. Aitchison, A. E. Berry, J. A. Monks and R. C. Stockton.

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Raw Material Markets

IRON AND STEEL

The retention of the equilisation fund, and the subsidy of 35s. per ton on pig-iron used in steel manufacture, probably mean the end of the immediate financial readjustments in the post-war structure of the iron and steel trade. There is still every inducement to use maximum tonnages of scrap, and no immediate increase in pig-iron production appears to be contemplated. When more labour is available at the foundries bigger tonnages of pig-iron will be required, but supplies are adequate for current needs and a clear case will have to develop before more furnaces are put into blast, since this in turn would involve increased fuel consumption.

Re-rollers have entered into impressive commitments for the supply of light sections, bars and sheets, and are unable to accept more than a small proportion of the export orders which are offered. The needs of important home industries command first attention, and export quotas, even at more attractive prices, have to be strictly limited. On the whole, supplies of billets, sheet bars, etc., are coming forward in sufficient tonnages for immediate needs, but the extent of the gap between consumers' aggregate requirements and the known limits of home-produced material underline the necessity of maintaining a steady flow of imports.

Transport difficulties are still exercising a restrictive effect on the clearance of finished steel. There are, however, few departments which are not encountering an overwhelming demand. For some months past it has been the light rolling mills which have had an abundance of work in hand, but now the heavy mills are no less favourably placed. Rolling programmes can be arranged on the basis of capacity outputs, and except for forward delivery dates there is little scope for the acceptance of further contracts from either British or overseas buyers. The demand extends over a wide range of products, including steel plates, light and heavy sections, rails, colliery equipment, wire, strip and brass and galvanised sheets.

NON-FERROUS METALS

A summarised report on the Malayan tin industry by Mr. A. D. Storke, Adviser to the Secretary of State for the Colonies, states that the estimated total output of recoverable tin metal for 1946 is 12,300 tons; in 1947, 46,150 tons; in 1948, 72,800 tons, and in 1949, 73,500 tons.

Empire producers of copper are seeking a higher price from the British Government. Whether they will get this with ease or not, is a matter for conjecture, though admittedly prices abroad are higher than those current in the United Kingdom.

The reopening of the Metal Exchange is an urgent necessity if London is to regain the influence in the metal trade it has wielded in the past. Free trading would also cast a little light on a somwhat perplexing position.

NEW PATENTS

The following list of Patent Specifications accepted has been taken from the "Official Journal (Patents)." Printed copies of the full Specifications are obtainable from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 1s. each.

572,474 SHORTER PROCESS COMPANY, LIMITED, and SHORTER, A. E. Surface heat-treatment of ferrous metal bodies.

572,484 STONE & COMPANY, LIMITED, J., MURPHY, A. J., and FRENCH, A. H. R. Refining of tin-base white metals.

572,491 SHEPHERD, G. R. (Westinghouse Electric International Company): Method of treating sheets of ferrous silicon magnetic material to produce an electrically insulating film on the surfaces of the sheet.

572,577 AMERICAN CHEMICAL PAINT COMPANY. Acid treatment of metals.

572,580 COLVILLES, LIMITED, and TODD, D. Discharge recorder for coke ovens.

572,646 FINER, H. J. Tubular metallic standards, poles, masts and the like.

572,656 GOODLASS WALL & LEAD INDUSTRIES, LIMITED, and LLOYD, A. Manufacture of sheet lead.

572,672 BRADBURY, T. F. Heat-treatment of multiple aluminium alloys.

572,703 SAMUEL, R. L. Metallic coatings on iron and steel.

572,751 FIELDSEND, C. F. Boxes or containers for use in cementation, annealing or other heat-treatment of articles.

572,930 SHORTER PROCESS COMPANY, LIMITED, and SHORTER, A. E. Surface hardening of metal articles.

572,957 FAIRFIELD SHIPBUILDING & ENGINEERING COMPANY, LIMITED, and DAVIS, A. W. Steam turbines.

572,960 NATIONAL SMELTING COMPANY, LIMITED, ROBSON, S., WOODS, S. E., and DERHAM, L. J. Production of zinc.

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